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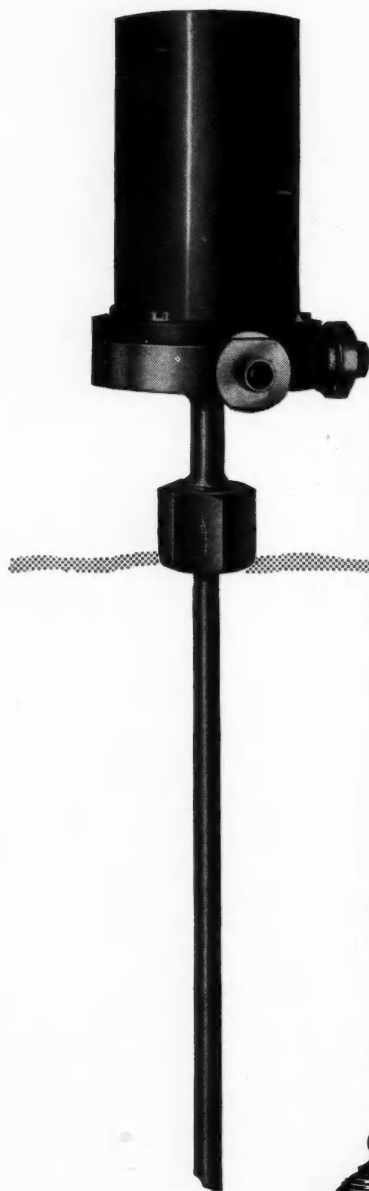
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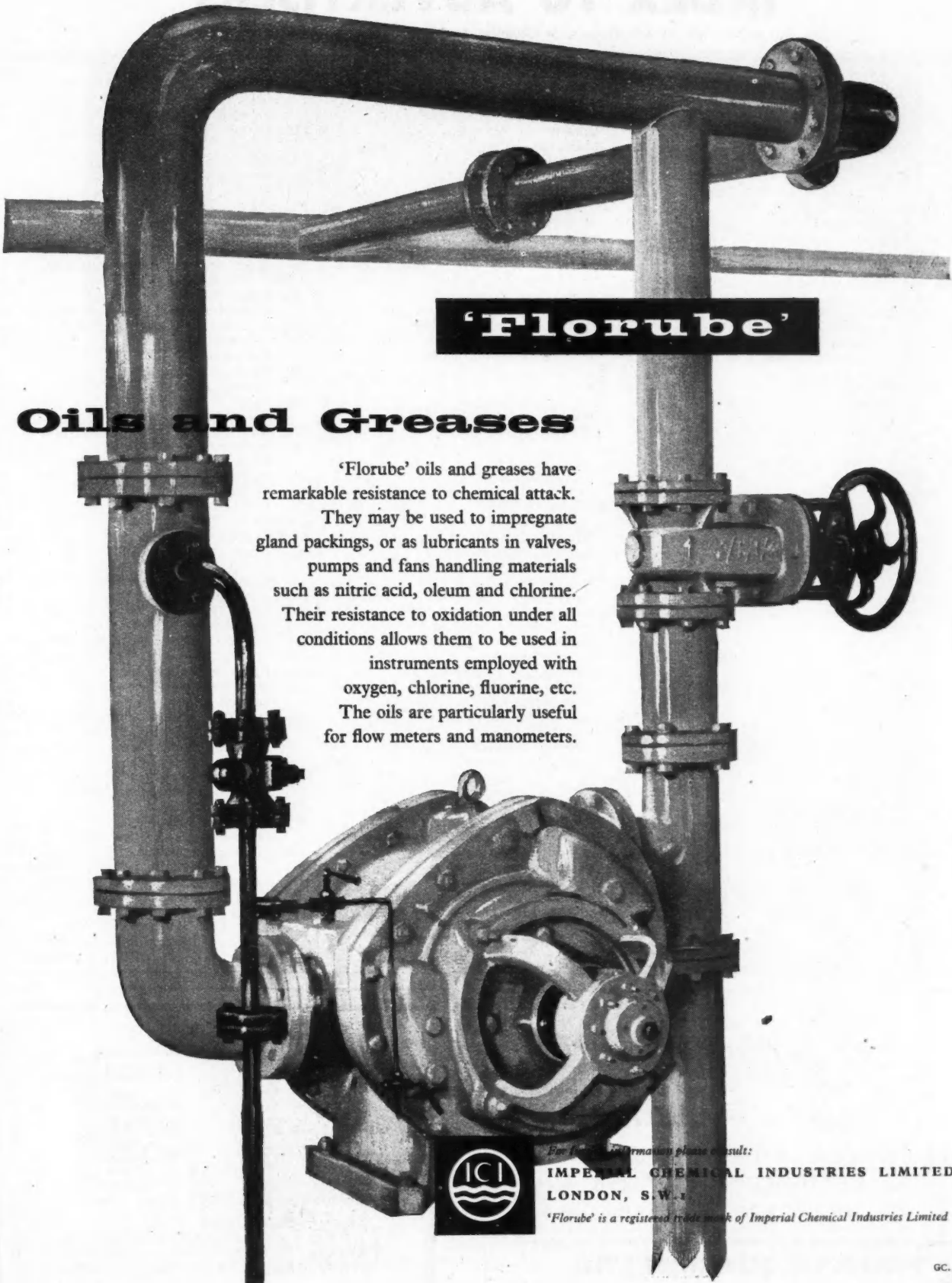
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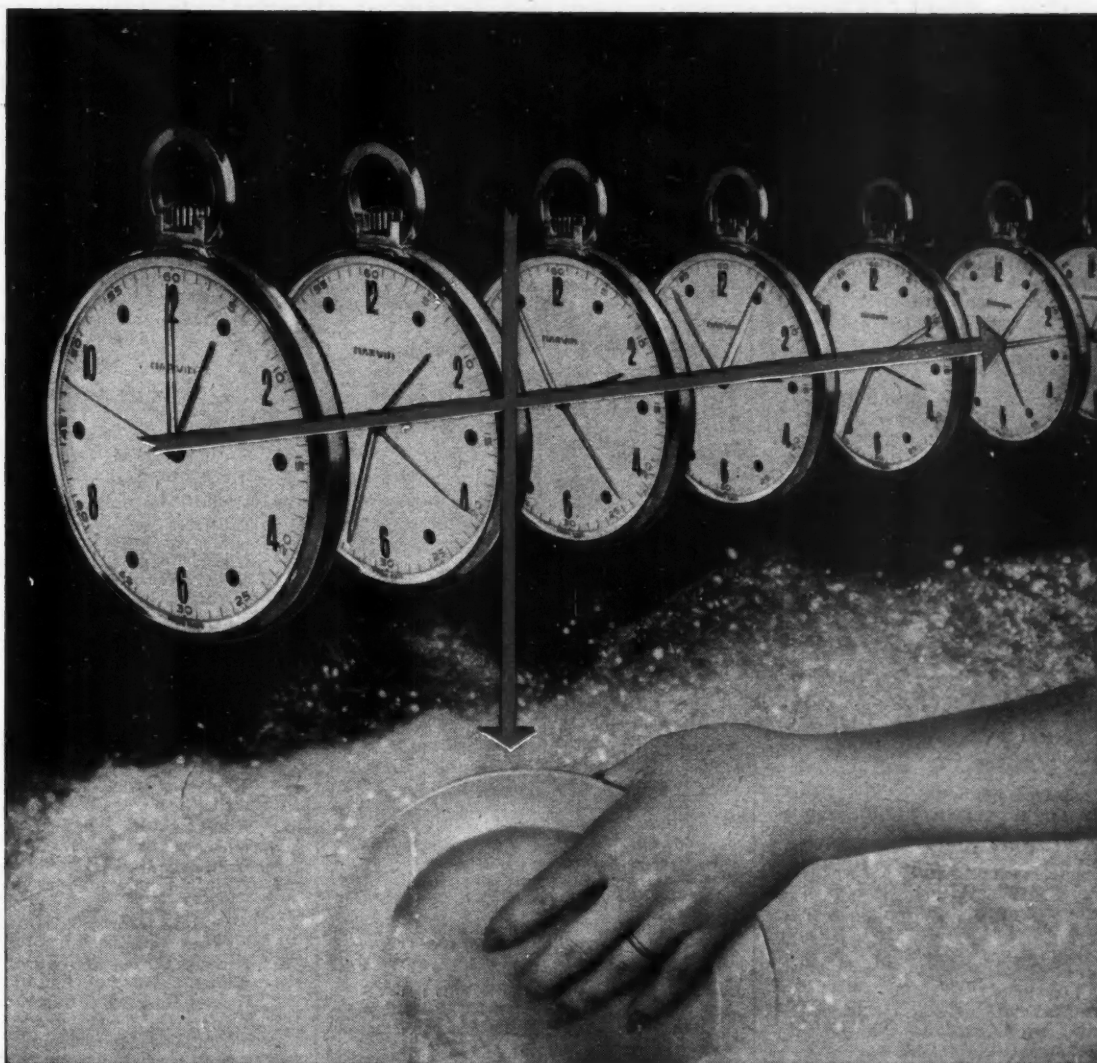
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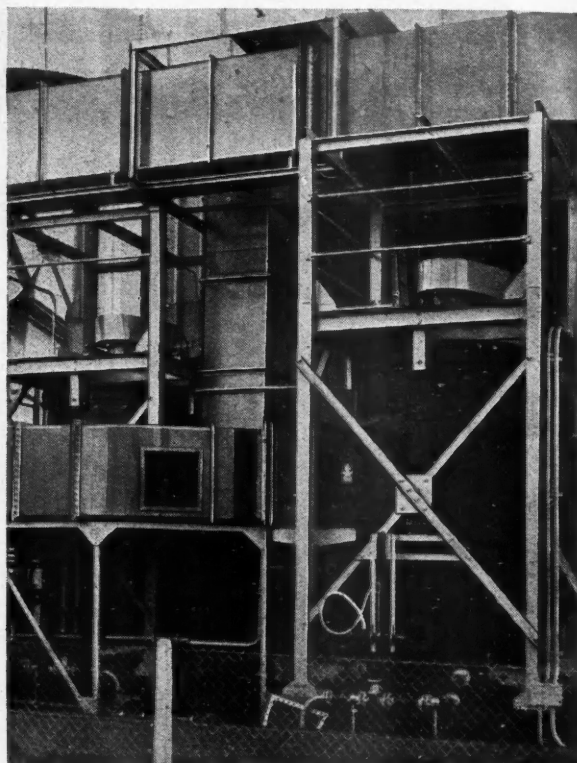
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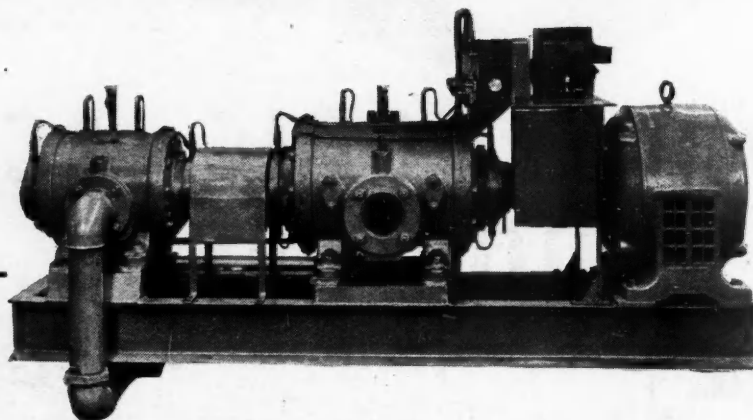
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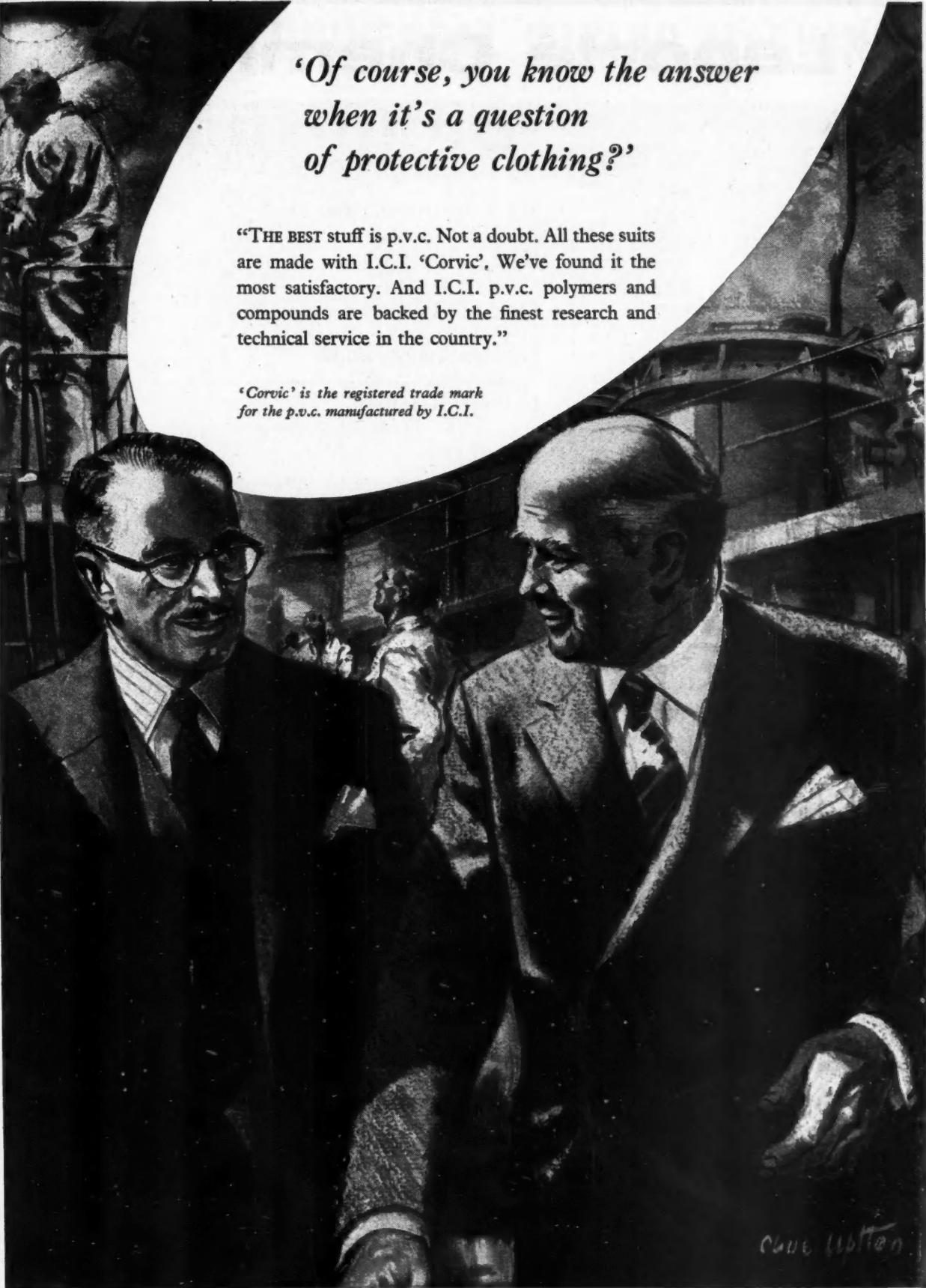
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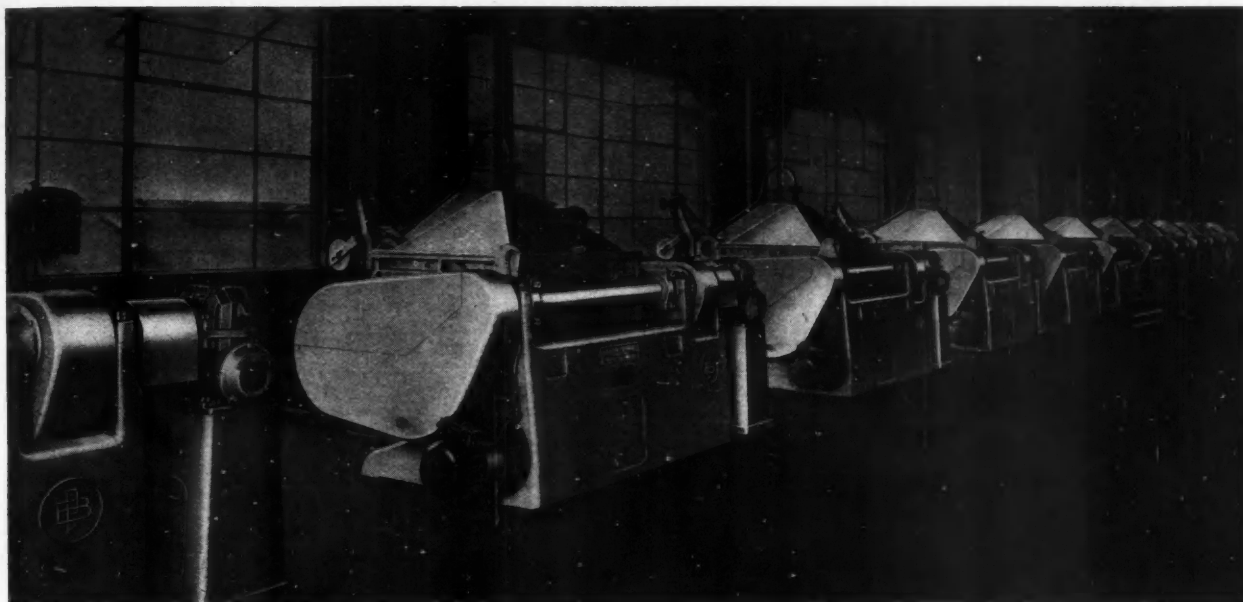
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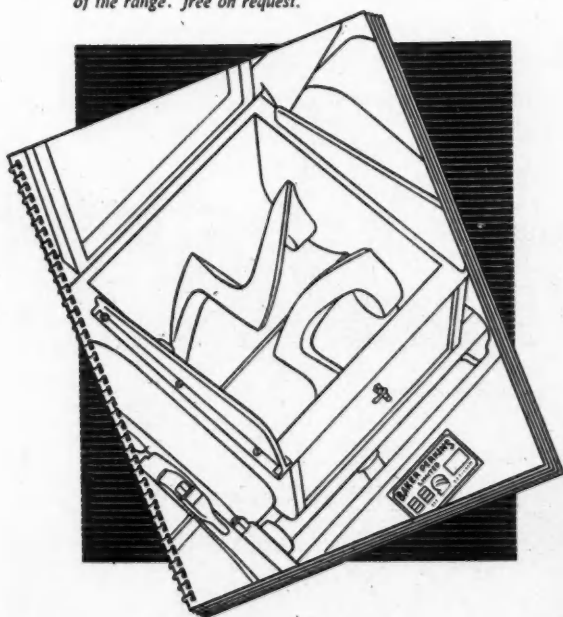


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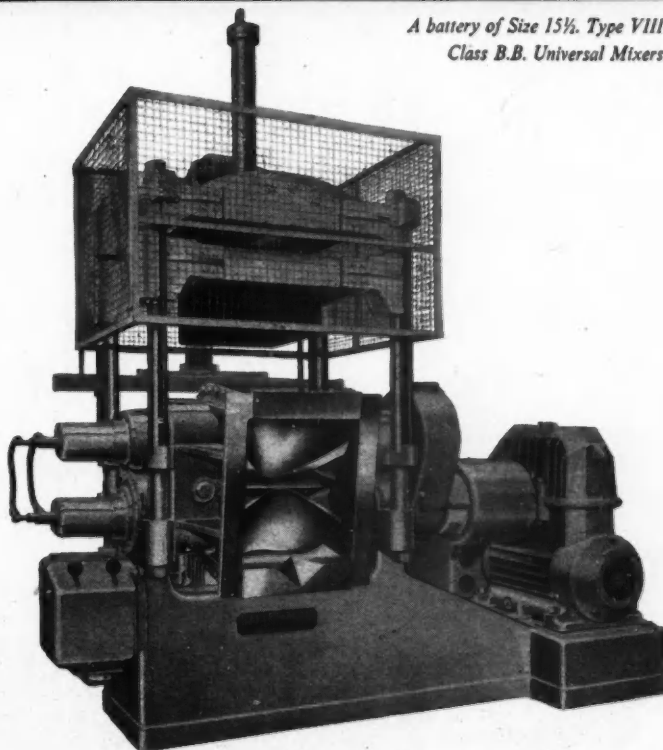


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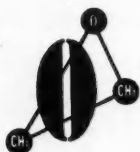
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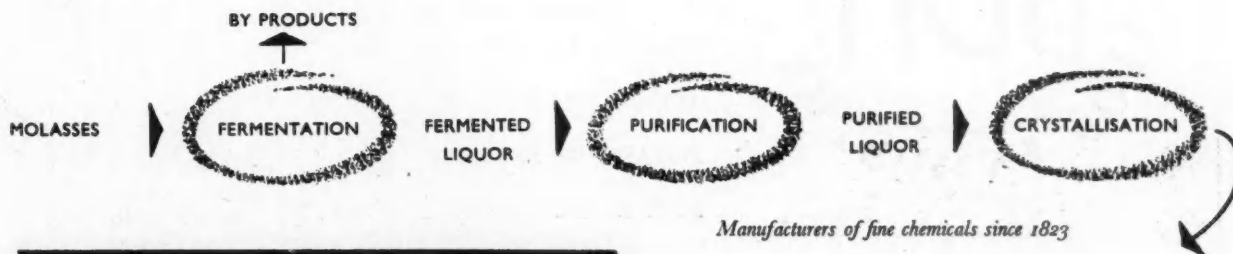
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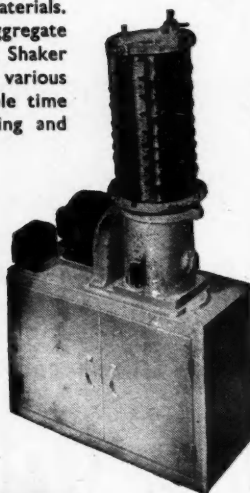
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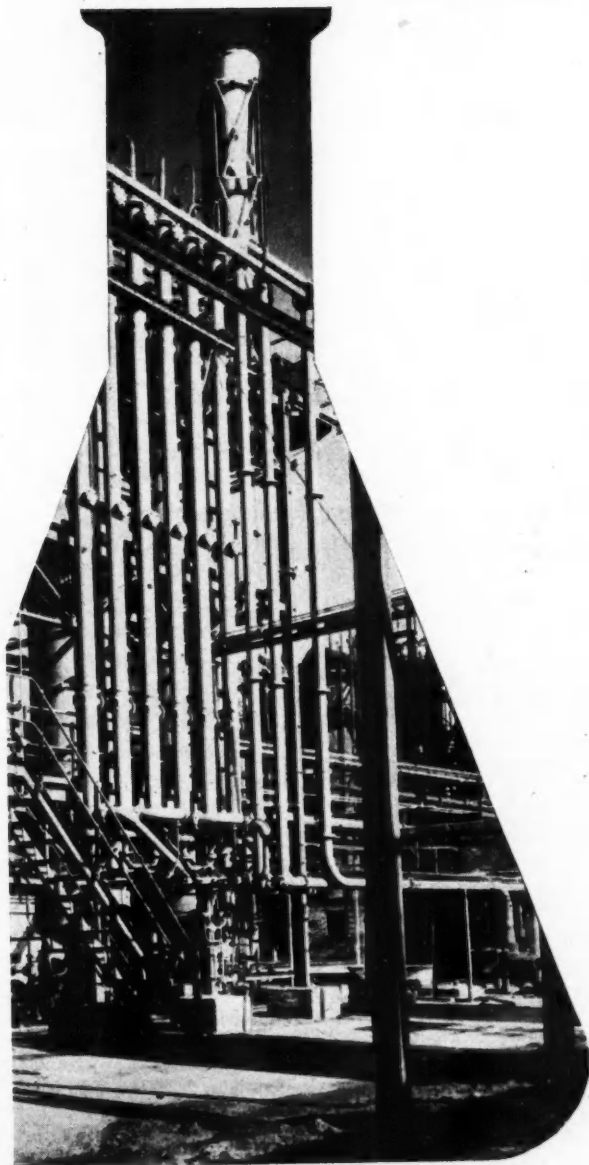
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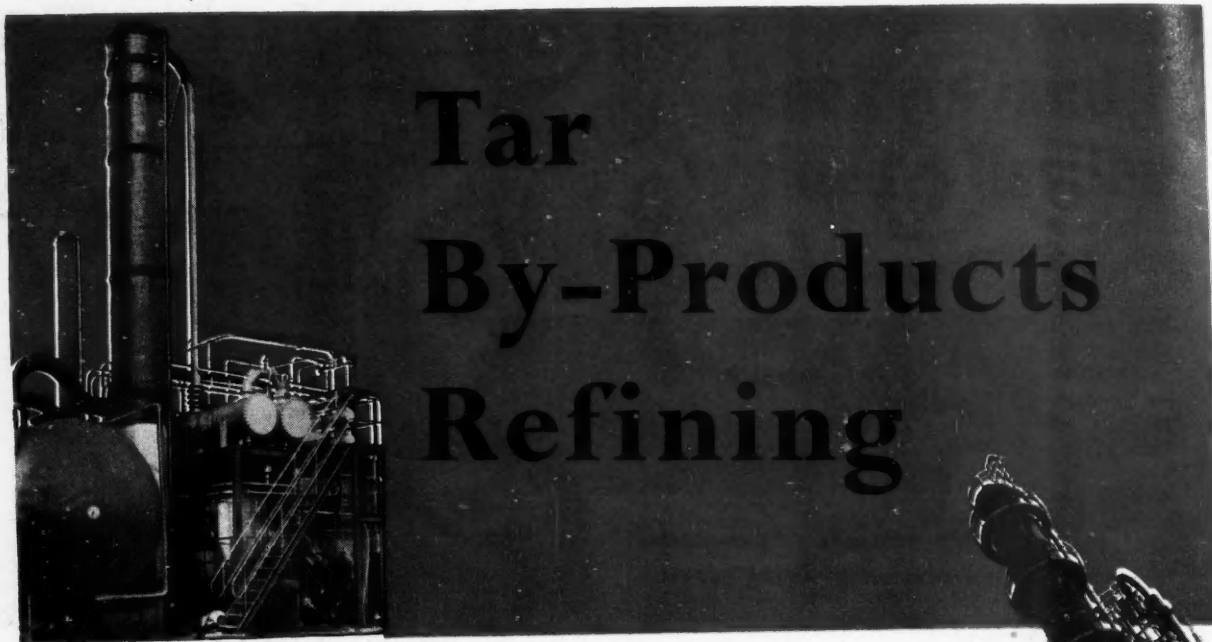
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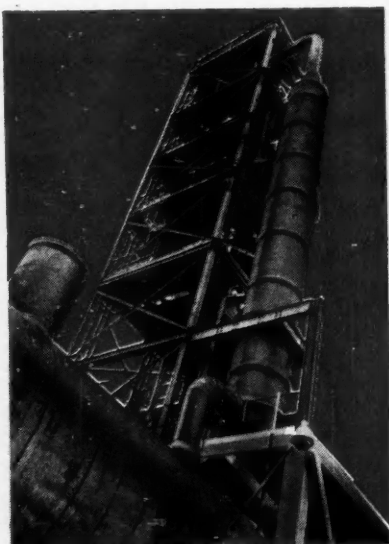


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CHEMICAL AGE

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RADIATION PROCESSING

THIS COUNTRY is leading the field in the development of economical atomic power, and at the radiochemical centre at Amersham, produces, sells and distributes radioactive materials. In 1955, the centre sent out over 12,000 radioactive consignments. At least 40 per cent of its products are exported and in 1955 were valued at half a million pounds.

Radioactive isotopes can be widely used in industry both in routine production and in research. Thus potentially dangerous porosities, cracks and inclusions in castings, forgings and large-scale welds can be detected by gamma emitting isotope sources, which replace X-ray apparatus. Isotope sources are simpler, more manoeuvrable, less bulky and much cheaper, and, moreover, require no high voltage electrical or water supplies. A particularly useful isotope for this purpose is caesium-137. Beta-emitting sources, such as thallium-204 or strontium-90 can assist in the dissipation of static electricity. Other common uses of beta and gamma-emitting isotopes are continuous control of thickness of plastics and paper, and checking packaged products.

A float containing a radioactive source will measure the level of a liquid in a closed vessel or tank. Such level indication can be obtained at extreme temperatures, with highly corrosive materials, and in other circumstances where normal gauging methods are unsuitable.

Spillage and leakage can be studied and examined by Geiger counter if a radioactive compound is dissolved in a volatile liquid. More recently, radioactive isotopes are being used in fertiliser manufacture to trace the effectiveness of mixing a few ounces of one particular chemical amongst tons of bulk material. By suitable choice of a radioisotope with a short half life there is no danger of radioactivity by the time the product reaches the packaging stage.

Chemical reactions can make good use of gamma radiation effects, which reduce temperature and pressure which are so often required in chemical processing. While catalysts are valuable agents in effecting such reactions the presence of a catalyst in the finished product is not always desirable.

Irradiation is proving of special value in its application to synthetic plastics and acrylate rubber. Undoubtedly cross-linking of organic molecules under the influence of radiation is, in quite a few instances, resulting in improved properties of chemically based products such as plastics. Research applications of irradiation by isotopes are numerous and increasing rapidly. Activation of a mixture of materials in an atomic pile enhances the ability to detect certain elements. Arsenic, for instance, can be detected and measured in far smaller quantities than was previously possible by normal chemical analysis methods. This new technique offers, therefore, facilities for the shortening and simplification of analytical procedure.

For chemical research procedures, the radiochemical centre at Amersham prepares organic or complex inorganic material with radioactive atoms. For medical purposes, drugs and various biological preparations are prepared or synthesised, having radioactive carbon isotope C14. Labelled atoms in a compound have made possible study of the exact mode of inter-

action of complex substances. Polymer chemistry is one very good example where tracer atoms have proved valuable in defining the complex structures.

With the atomic power programme now getting under way, large quantities of mixed fission products, many of them gamma emitters, will be available for use. The long-lived fission products, caesium-137 and strontium-90, are expected to become more important as the quantities available increase and considerable development is being undertaken at Amersham to produce stronger sources of radiation products for use in chemical processes and in the sterilisation of antibiotics.

The question now before the UK chemical industry is whether it will pursue the possibilities afforded by atomic radiation for promotion of chemical processing? Radiation is potentially cheaper if acquired as an atomic power by-product than many present methods.

In the US, chemical companies are beginning to regard roentgens as raw materials. Some 100 companies are processing and redistributing radioisotopes. Several in response to the growing demand for radiation sources, are expanding their radioisotope processing facilities. In fact, it is considered in the US that it will soon be economical for private industry to make its own radioisotopes.

The US Atomic Energy Commission is understood to be encouraging industry's use of radioisotopes and quantities which may be possessed under general authorisation or licence have been increased. The Commission is making 300,000 curies of cobalt-60 available for civilian use this year, and it is building a multicurie fission products pilot plant at Oak Ridge to help meet demands for long-lived fission products. This will also serve as a pilot plant for future industrial fission product separation plants having a capacity for separating 200,000 curies per year of caesium-137, plus substantial quantities of strontium-90, cerium-144, and technetium-99.

According to Willard F. Libby, of the US AEC, isotopes are nearly paying their way now. A study completed by AEC indicates that US industry and agriculture is making savings of approximately \$500 million a year by using iso-

topes which costs the US Government about \$3 million a year. (This excludes research benefits or savings and benefits to medicine.) By 1960 it is estimated that the saving will be perhaps \$5 billion a year at a cost to the Government of not more than \$20 million.

In spite of this encouraging trend, US organic chemical industry does not at present make any important use of either radioactive carbon or radioactive hydrogen. A reasonable explanation is the present cost of the radioactive materials. With increased demand and greater usage, of course, the cost of radioisotopes will decrease.

UK chemical industry, if one judges from information available and annual reports, is similarly not investigating radiation processing. Installations of private atomic reactors by the largest UK chemical concerns have not been announced. At the same time it is recalled that there is no shortage of radioisotopic material from Amersham and cost of radioisotopic material is stated not to be as high as in the US.

It is understood, however, that UK chemical manufacturers have so far shown little interest in possibilities of radiation processing and, for example, of producing the commoner acids by radioactive techniques. With the large atomic power programme radioactive materials will be in good supply and should prove reasonably economic.

In comparison with UK chemical industry, some of the larger German chemical concerns mention radioactive investigations and new laboratories being set up for these studies. Well-informed circles here consider that Germany will go ahead with radiation chemistry in a big way.

In the US the call has gone out to the chemical industry to consider carefully and to investigate the possibilities of radiation processing. Germany is definitely interested, no doubt because German chemical concerns see in radioisotopes, a means of overcoming power problems. The UK has supplies, considerable knowledge to call upon and an advisory service. It is hoped, therefore, that we shall be hearing of progress in radiation processing from the chemical industry here, in the near future.

NIOBIUM DEVELOPMENTS

NIOBIUM has proved to be stable and effective in preventing fission products from passing through the cores of fast reactors. In resistance to heat and corrosion, this metal surpasses metals such as zirconium, molybdenum and vanadium. Addition of niobium or tantalum to non-ferrous alloys has improved workability of these alloys. These metals, indeed, are foremost as effective carbide formers.

Until the beginning of this year, there have been restrictions in the US on the use of niobium in these alloys, states Ronald L. Carmichael of Batelle Memorial Institute US. Development now, however, is very rapid and it is believed by some authorities that this use of niobium is exceeding the use of niobium as a stabiliser in stainless steels. About 30 niobium-containing superalloys are said to be being produced, with niobium contents of from 0.44 to 4 per cent.

Niobium is used in stainless steels required in chemical and petroleum processing equipment which operate at high temperatures with corrosive atmospheres. Added to austenitic chromium-nickel steels, niobium prevents carbide precipitation in the 800° to 1,600° F. range.

According to Carmichael, US nuclear energy equipment may well require about 20,000 tons of niobium stabilised steel, five years hence. In the US, future consumption of pure niobium metal is estimated at between 10,000 and 60,000 lb. a year. This amount will depend on the US Atomic Energy Commission's experiences with cladding

cores of fast reactors. Moreover it is suggested by this Batelle worker that if niobium-based alloys can be sold at competitive prices, demand could reach a million pounds a year.

Cost of niobium is important. There is report of a new liquid-liquid separation process, which can produce niobium oxide for about \$3 a lb. in amounts of 250,000 lb. a year. If this process proves to be workable, niobium metal could be produced for \$10 to \$12 a pound. The present price of niobium metal in this country is £570 per ton. Considerable interest has been shown in finding deposits of niobium-containing ores, particularly by the US, whose reserves, according to a Beryllium Corporation spokesman (Kenneth B. Higbie) at the recent US niobium symposium, amount to about 53,000 tons of Nb₂O₅. Africa, of course, appears to have the greatest reserves with columbite containing 70,000 tons of niobium (Nb₂O₅) plus 1,200,000 tons in pyrochlore deposits. Canada has pyrochlore deposits containing about 400,000 tons of the pentoxide and Norway has about 500,000 tons.

What is now sought are suitable methods of recovering the metal and development of uses of niobium to assist the industry. Steel makers in the UK have, until recently been discouraged by the very high price of the metal. With the development of more fast breeder reactors, prospects for niobium are considered to be good.

HEDLEY'S OPEN NEW RESEARCH CENTRE

Product and Basic Research

NEW research headquarters of Thomas Hedley and Co. Ltd. were opened by the Duke of Northumberland on Friday 14 June. Situated on a 45-acre site at Longbenton, Newcastle upon Tyne, the new building houses two of Hedley's research departments; product research and development.

Speaking to the 250 guests the Duke said that in the early days of industry, organised research was non-existent.

'Most of the great early scientific and industrial development, such as Stephenson's steam locomotive and Sir Charles Parsons' steam turbine were the result of individual genius, working with the equipment which each had to invent and manufacture for himself.'

The site, which was chosen from 27 possibilities, is on the outskirts of Newcastle. The building consists of two main blocks on an east-west axis with a connecting north-south block. With the exception of the rear east-west block the building is single storey. Allowance has been made in the design for ease and flexibility of future extensions.

Product Research

All laboratories in the front east-west block are placed on the north side so that sunlight will not interfere with tests. These laboratories are mainly intended for product research work and include a fully equipped home laundry and bakery. Administrative and executive offices are situated on the south side.

Edible products research laboratories and constant temperature rooms are contained in the north-south connecting block, together with the chemical store.

Pilot plant equipment is housed in the rear east-west block. The western end of this block is clear from floor to roof to house the larger pieces of pilot plant. Smaller pilot plant is located under the mezzanine floor which covers the remaining two thirds of the area. The engineering division development area and service shops are placed under the mezzanine floor. Offices, laboratories and smaller pieces of pilot plant are situated on the mezzanine floor.

External wall cladding for the pilot plant building is an aluminium framed curtain wall fixed to the main steel frame. The framing is filled in with window or Holoplast double thickness insulated sheeting. A complete wall unit can be removed if necessary to allow large pieces of equipment to be brought in or removed.

Before the official opening ceremony the press were shown some of the work being carried out both in the new building and at the basic research and technical service departments situated in

Here a chemist in the development department of Hedley, studies the variable in a reaction just leaving the test tube stage



laboratories adjacent to the Newcastle factory.

It was emphasised by Dr. E. R. Wilson, head of the basic research department, that by 'basic' Hedley really meant basic. The work had no immediate commercial application and was on the same plane as university research.

Research into the theory of fluorescence is being carried out. Work done so far indicates that for a 'fluorescer' (fluorescent agent) to adhere to a fabric it is necessary for both molecules to have the same distance between functional groups.

Other basic scientific work includes the study of adsorption on surfaces and the physical chemistry of foaming. Newer methods of instrumental analysis are being investigated. A Grubb Parsons infra-red spectrophotometer is being used to obtain information about the structure of new compounds. This instrument, one of the first of its kind to be made anywhere in the world, is said 'to provide in a few minutes information that would take years of study by normal chemical methods'.

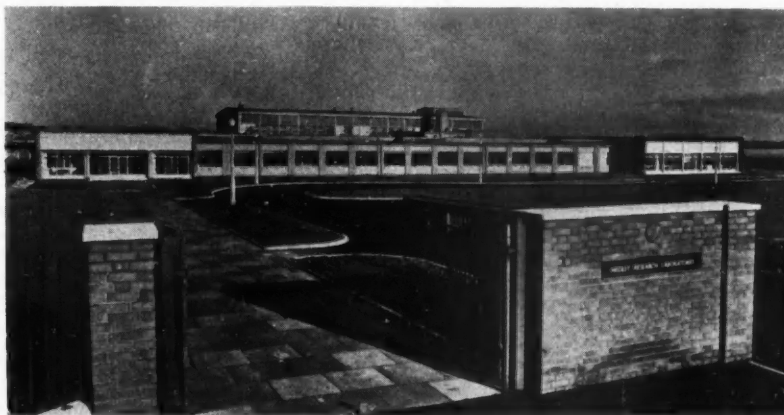
Apart from research in their own

laboratories Hedley sponsor research projects in universities. This work has normally no immediate application to Hedley as the research topic is chosen by the university.

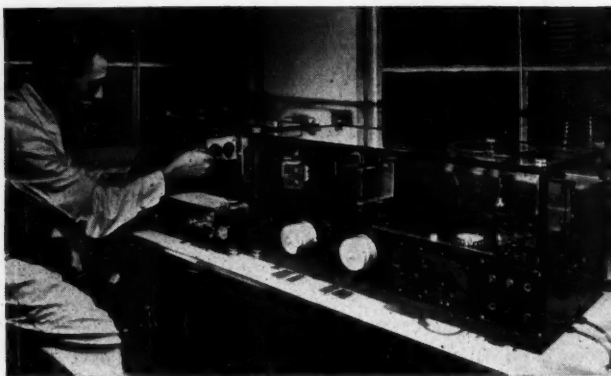
At the new laboratories work of a more practical nature is carried out. Examples were shown of fabrics washed with and without a fluorescer. It was pointed out that the problem of the fluorescer was by no means solved as for some of the newer synthetic fibres a suitable agent had not yet been found. As was demonstrated in the basic research department, a fluorescer which takes to cotton will not necessarily take to Terylene or nylon.

An interesting application of radioactive tracer technique was shown in the toothpaste research department. To test the abrasive action of various toothpaste formulations teeth obtained from dental hospitals, are rendered radioactive in an atomic pile and are then subjected to a measured amount of brushing with the toothpaste suspended in water. The amount of radioactivity which appears in the water is a measure of the abrasive action of the toothpaste.

In the home laundry much care is



The new research building of T. Hedley and Co. Ltd., occupy 8 acres of a 45 acre site chosen to give ample room for expansion



By the use of electronic equipment such as this Grubb Parsons infra-red spectrophotometer a chemist in the basic research laboratories of Hedley is able to obtain in 'minutes information about the structures of new compounds which would require years of study by normal chemical methods'

taken to simulate as closely as possible the conditions occurring in the home. All the different forms of washing equipment are there, from the scrubbing board to the latest electric washing machine with spin drier.

One of the most serious allegations made against synthetic detergents is their effect on the skin. In an attempt to refute these allegations Hedley carry out tests on all their products and two booklets have been produced containing the results. Although the results obtained from this kind of work are very difficult to interpret, the general conclusion drawn is that detergents are in no way the hazard that people, in particular housewives, claim.

There is, in fact, no reason to suppose that they are a greater hazard than the general purpose soap powders that were used in every home before their introduction.

Some of the reasons for this bad name are discussed. Any new product of suffi-

cient public interest will normally promote both commendation and condemnation, say Hedley. Detergents, when they first came on the market, were backed up by an intensive advertising campaign, and they were surprisingly efficient.

'It is hardly surprising' goes Hedley's argument, 'that they became—and remained—a household word and topic of conversation. Thus, when, for whatever reason, her hands became chapped or she developed a rash, the housewife was likely to think at once of the new detergent she was using.'

'Frequently she would seem to find confirmation in the fact that the trouble followed shortly after washing, which is not surprising considering how often each day she does so.'

Hedley's last word on the subject is: 'Whatever the reason, the strong body of public opinion that detergents constitute a hazard to the housewife is not in accord with the facts.'

BIRTHDAY HONOURS LIST

RESearch workers in industry, university and in official organisations figured in the Queen's Birthday Honours, announced on 13 June, with awards of C.B.E., O.B.E., M.B.E. and B.E.M. The list included the following awards:

Knighthood

WILLIAM SINCLAIR, director of the Dunlop Rubber Co. (Scotland) Ltd.

C.B.E.

P. W. BURBRIDGE, professor of physics, University College, Auckland, NZ.; D. P. CUTHBERTSON, director, Rowett Research Institute, Bucksburn, Aberdeen; E. L. HIRST, Forbes professor of organic chemistry, Edinburgh University; J. A. McMILLAN, senior education and advisory officer, National Agricultural Advisory Service; J. G. PEARCE, director of research, British Cast Iron Research Association; D. G. SOPWITH, director of mechanical and engineering research, Department of Scientific and Industrial Research; C. M. VIGNOLES, managing director, Shell-Mex and BP Ltd.; H. H. WATSON, chemist and assayer, Royal Mint; J. WRIGHT, director, Dunlop Rubber Co. Ltd.

O.B.E.

H. C. BUTCHER, deputy director of chemistry, Federation of Malaya; W. E. CALTON, Government chemist, Tanganyika; A. W. CHAPMAN, registrar, Sheffield University; B. A. ELLIS, senior principal

scientific officer, Government Chemist's department; J. C. FIDLER, principal scientific officer, Food Investigation Organisation, DSIR; G. L. GIBBONS, chief laboratory officer, Courtaulds Ltd.; A. GLOVER, head of technical research, Co-operative Wholesale Society Ltd.; R. S. HASKEW, chairman and managing director, General Chemical and Pharmaceutical Co. Ltd.; W. J. STERN, principal scientific officer, Ministry of Defence; A. L. STORY, senior principal scientific officer, Air Ministry; G. WESTON, technical director, British Standards Institution; E. WHITWORTH, deputy research manager, ICI Ltd., Nobel Division, Ardeer; W. WOOD, head of virus research unit, Glaxo Laboratories Ltd.; A. WRAGG, manager shell department and chief metallurgist, Vickers-Armstrongs (Engineers) Ltd.

M.B.E.

T. H. ARNOLD, deputy controller of research, Hadfields Ltd.; E. H. COLEMAN, senior experimental officer, Fire Research Station, DSIR; T. H. MESSENGER, head of library and intelligence division, Research Association of British Rubber Manufacturers.

B.E.M.

E. ABEL, foreman fitter, Laporte Acids Ltd.; T. D. BUCKLE, laboratory worker, grade A, Atomic Weapons Research Establishment, Aldermaston.

Hygrotherm System for New Synthetic Resin Plant

CONTRACT for the heating and cooling system of the new synthetic resin plant of Styrene Co-Polymers Ltd. has been awarded to Hygrotherm Engineering Ltd., 5 Fitzhardie Street, London W1.

The heating and cooling plant will consist of a Hygrotherm heat generator with a ring main and loop circuit system. Pneumatically operated three-way valves will control the temperature at which the heat transfer medium is supplied to the reaction vessels of the resin plant. The heating medium will be Shell Voluta 45.

A feature of the heating and cooling systems will be the simplicity and precision of the temperature control which it is said will be within $\pm 1^\circ\text{C}$.

CHEMICAL ENGINEERS FEDERATION

This week Alembic reports that the Institution of Chemical Engineers has joined the European Federation of Chemical Engineers. At the same time the Society of Chemical Industry reaffirms its opposition to the federation. See Distillates p. 1044

Home Secretary will be Instrument Makers' Chief Guest

ANNUAL LUNCH of the Scientific Instrument Manufacturers' Association will be held at the Savoy Hotel, London, on 5 July. Chief speaker will be Mr. R. A. Butler, Home Secretary and Lord Privy Seal, who will be presented with the first copy of the association's newly published handbook 'British Nucleonic Instruments 1957.'

Other guests will include Sir John Maud, permanent secretary to the Ministry of Power, Mr. Ernest Marples, Postmaster-General, Sir John Cockcroft, director of the Atomic Energy Research Establishment and Sir Graham Hayman, president, Federation of British Industries. Mr. G. A. Whipple (chairman, Hilger and Watts Ltd.) president, will preside.

Experimental Water-Repellent for Wool

Experimental water-repellent D 9168, said to be the first silicone finish to be developed for application to wool that does not require the use of special high temperature baking equipment, is described in publication D 31 in the series of *Silicone Notes* issued by Midland Silicones Ltd., 19 Upper Brook Street, London W1. An oil-in-water emulsion containing 30 per cent by weight of a highly reactive silicone, the finish has a pH of 5 to 7, and is used in conjunction with a catalyst. According to the company the new finish may be applied to yarns and knitted fabrics as well as to woven fabrics. Mill trials now in progress are said to indicate that certain mixtures may be treated where the blend incorporates a substantial proportion of wool.

GROWING IMPORTANCE OF CHEMICAL ACETYLENE

Stressed at BAA Annual Lunch

CHEMICAL acetylene now accounts for a greater proportion of the use of acetylene than any other use in North America. This was stated by Dr. H. S. Sutherland, executive vice-president of Shawinigan Chemicals Ltd., when he replied on behalf of the guests at the annual lunch last week of the British Acetylene Association. The rapidly increasing importance of acetylene in the chemical field was referred to by other speakers.

Dr. Sutherland said that many of those present might not like the shift of emphasis from calcium carbide to the newer forms of acetylene from oil and from natural gas, but they were changes no one could ignore.

In North America, the International Acetylene Association had recently set up three new technical committees to take note of recent developments and trends and it might well be that the British association would before long be thinking along similar lines. The new committees, would consider the large scale handling of acetylene from three viewpoints; the metering of acetylene, a subject of some controversy, but very desirable from the producers' point of view; methods of analysis of acetylene; and a study of the quality of acetylene. The latter two committees were important in view of the newer sources of acetylene.

Toast of the Guests

Mr. Frank Newport (Murgatroyd's Salt and Chemical Co. Ltd.), a past-president of the association who was elected an hon. member earlier this year, also replied on behalf of the guests. The toast of the 'Guests' was proposed by Mr. E. Seymour-Semper (Hancock and Co. (Engineers) Ltd.), vice-president, who particularly welcomed Mr. L. E. Hoddle, a direct descendant of three past-presidents.

Proposing the toast of the association, Sir George P. Barnett, HM Chief Inspector of Factories, declared that acetylene was now significant and important in the chemical field. Carbide was being produced in the UK for the manufacture of acetylene in connection with the production of some of the newer types of plastics.

Sir George referred to the extensive use of welding at the new atomic power stations and nuclear research units. In these cases, welding had to stand up to rigorous and comprehensive radiographical inspection.

Mr. N. L. G. Lingwood, president of the association, who replied, stated that the association was assuming increasing responsibilities with the greater application of acetylene in the chemical sphere. He added 'You may rest assured that your association is not losing sight of this fact and it will take an increasing interest in this field'.

Mr. Lingwood, on behalf of the asso-

ciation, conferred hon. membership on Mr. Arthur Stephenson, who was retiring after 45 years' active connection with the BAA. A member of the council since 1940, Mr. Stephenson served as president in 1935/36 and had been BAA delegate to the Commission Permanente Internationale de l'Acetylene since 1948.

At the annual meeting held earlier the same day members received the report for 1956/57 which stated that much remained to be done before it could be said with certainty that a dependable but cheap-to-operate procedure had been

found for the elucidation of the factors which affect the reliability of sampling a consignment of carbide. But the technical sub-committee on sampling and testing of calcium carbide, set up by the regulations committee of the association had met a number of times during the past year and had made considerable progress.

A further technical sub-committee, on generators and ancillary apparatus, had made progress in its task of revising the association's regulations.

The association was represented at the May meeting in Vienna of the Commission Permanente Internationale de l'Acetylene by Dr. F. H. Peakin (ICI Ltd.), Mr. F. J. Clark (British Oxygen Co. Ltd.) and Mr. N. L. G. Lingwood (British Oxygen Gases Ltd.).

During the year the association continued to be called on to arrange abridgement tests on calcium carbide imported from and supplied to many parts of the world.

Royal Dutch/Shell Now Among World's Chemical 'Top Ten'

THE growth of the petrochemicals side of the Royal Dutch/Shell Group has been so great during the past 25 years, that the group now ranks among the world's ten largest chemical manufacturers on the basis of turnover; chemicals now contribute about eight per cent of the total group proceeds after deduction of sales taxes.

This is stated by Mr. N. G. W. Luitsz of the Shell Petroleum Co., in a special article on 'Chemicals from petroleum' in the special June issue of the *Shell Magazine* which reviews 50 years of progress by the group.

Mr. Luitsz concludes his article by saying 'There remains little doubt that the future will see a growing diversification and expansion of Shell's chemical enterprises and that the products of our chemical plants will play an ever-increasing part in the industries and agriculture of the world!'

The same issue contains a contribution entitled 'I remember,' by Mr. J. B. Aug. Kessler, C.B.E., chairman of the Royal Dutch Petroleum Co., one of the first to realise the immense possibilities of the petroleum-based chemical industry.

After an abortive exploratory meeting with German interests in 1927, Mr. Kessler came to the conclusion that the group should go into the chemical industry under its own steam and that its first products should be ammonia and ammonium sulphates, from which the Germans were then making huge profits.

Mr. Kessler received the go ahead for his plans and a company known as Mekog was formed in 1929 with plant at Ijmuiden, Holland, using coke-oven gases instead of refinery gases. From experience thus gained a synthetic ammonia plant was started up in California shortly afterwards.

Meanwhile after a long series of experiments, the group's research staff had found that hydrogenation was not the only road to follow, as a far wider range of products could be manufactured by

developing other processes. As a result a small synthetic solvents plant was erected at Martinez Refinery where several of this range of new products were synthesised.

Ten years of difficulties followed and although the future seemed to hold glittering prospects, it was not always easy to convince everyone that there was a place for the group in the chemical industry. The second world war gave tremendous impetus to the research and subsequent development of petrochemicals and the range was extended far more quickly than might otherwise have been the case. This speeding-up had been energetically continued since the war.



Towering distillation columns of the Shell Saint Gobain petrochemical plant at Berre-L'Etang. By courtesy 'Shell Magazine'



★ ALEMBIC welcomes the news that the Institution of Chemical Engineers has taken the initiative in securing British representation in the European Federation of Chemical Engineering. This news has come to him from a reliable correspondent in West Germany, but Alembic has not been able to confirm it with the Institution whose spokesman says 'No comment'.

However, Mr. R. C. Odams, joint hon. secretary, and Dr. J. B. Brennan, general secretary, are said to have attended a meeting of the federation's direction committee, held recently in Amsterdam. Their application is reported to have been most warmly received and to have been referred to the board for formal approval. Alembic understands that this is a mere formality and that practically speaking, the institution is now affiliated to the federation.

In addition it is understood that a third secretariat is likely to be opened in London. The other two are provided by DECHEMA at Frankfurt and by the Societe de Chimie Industrielle in Paris.

The Society of Chemical Industry should, of course, now take similar action. But that is not likely, for a recent issue of their official journal shows they are still unconvinced of the need for a European federation. Alembic disagrees strongly with this isolationist policy and hopes that wiser counsel will prevail.

Since both the institution and the society already have close ties with the Dutch chemical engineers, who are members of the federation, SCI participation in the wider association is, to Alembic at any rate, a logical step that cannot long be delayed.

★ ONE OF Alembic's regular readers wonders whether ICI are to follow Godfrey Phillips, the Four Square tobacco people, into the paper-backed publishing field. His enquiry stems from an error in Distillates last week, when Dr. James Craik was referred to as the chairman of the company's Novel division!

ICI's vast output of technical and promotional literature must rank them as a major 'publishing unit', but it would be a travesty of the truth if Alembic were to suggest that the company ranked as publishers of fiction.

★ THE STORY of how the Royal Dutch/Shell group entered the petrochemical field, after refusing to be browbeaten into 'co-operating' with German interests in 1927 is told by Mr. J. B. Aug. Kessler, chairman of the Royal Dutch Petroleum Company, who in his early years, served the group in Russia and Rumania (see

also p. 1043). Later he was to help pioneer the development of the petroleum-based chemical industry.

Following overtures to the group and to a US oil company from a 'very large German chemical company' which thought they had solved the problems of the industrial application of their hydrogenation process, Mr. Kessler, as group managing director, attended a meeting in August 1927. He listened to the head of the German firm 'describing with the utmost precision' how his firm, by producing synthetic dyes and fertilisers, had already put out of business several firms that produced the natural products.

'It was clear that his intentions for co-operation with the group were of a very one-sided nature and that if we did not like his proposals we must be prepared to expect the worst'. Mr. Kessler had already been shown the possibilities of producing fertilisers from petroleum-based materials by hydrogenation and at that time the group was burning to waste large quantities of valuable gases obtained during refining. He concluded, therefore, that since the group could not possibly work with such partners, it would go into the chemical industry under its own steam.

★ FOLLOWING the news published by Alembic on 1 June that Montecatini were seeking a suitable site in the US for a chemical plant, he now learns that Montecatini engineers are due shortly in the US town of Huntington. They are to study the site that has now been selected for the construction of a new plant for the processing of petrochemical products.

Mr. Mario Ottolenghi, vice-director of Chemore Corporation, Montecatini's US representatives, has stated that building work will be started in 1958. Montecatini officials in Rome say they have no information as yet on the subject and that the details are being arranged directly by their US associates.

★ THE TERM 'research' is a wide one and is apt to mean different things to different people. It was defined last week at the annual meeting of ICI by chairman Sir Alexander Fleck as 'the process of producing new knowledge by the systematic study of phenomena or by the critical analysis of existing data'. That definition is certainly applicable to all research, whether academic or industrial.

As Sir Alexander pointed out, research in industry differed in the ultimate aim from academic research, but not in the scientific method nor in the mental approach required. He referred to the increasing trend in industry towards

'target research' which sets out to find a product to meet a defined need.

As an example of such target research, he instanced the discovery by ICI chemists of the new anaesthetic Fluothane which the company believed to be the best general inhalent anaesthetic so far developed. Research started with the clear aim of finding an anaesthetic which would be ceratin in its action, safe in prolonged application, free from unpleasant after-effects and, in addition, non-inflammable. The search for such a material was guided by a systematic study of chemical structure in relation to those requirements.

Now comes the task of determining how Fluothane may be manufactured efficiently and economically. This second step in the development of a new product can make an even bigger call on research effort than the original discovery. The third and final step is scientific engineering design of the necessary plant, which also calls for the highest technical ability if a quick and effective entry into a market is to be achieved.

★ THE PATH of the 'do gooders' of this world is never an easy one. But who would have thought that anyone would be so churlish as to look a gift DDT factory in the mouth? That is what has happened to UNICEF. In 1952, this UN specialised organisation presented a complete DDT plant to Ceylon on condition that it was operated to its full 700-ton a year capacity.

The plant has now been returned to the donors because costs of production are stated to be substantially above imported prices.

★ DOUBTS have been expressed recently about the suitability of nylon for certain industrial purposes where it is liable to be exposed to strong sunlight for long periods. In common with other textile fibres, nylon is affected by sunlight. The British Nylon Spinners have been quick to point out that high tenacity nylon will perform satisfactorily even in tropical conditions.

This yarn has a minimum tenacity of 7 grams/denier, equivalent to about 100,100 lb./sq. in., while a new yarn recently introduced has a tenacity of 8.8 grams/denier. Coated nylon fabrics are being used for fumigation sheets in East Africa with, it is stated, excellent results. Recent tests on a p.v.c.-proofed nylon tarpaulin, used for more than a year in tropical conditions, are stated to show that it retained its full tensile strength and tear strength and that elongation at break was the same as when new.

The final BNS broadside has been primed by the Royal Navy. The resistance of high tenacity nylon to light degradation is said to be shared by medium tenacity bright nylon. And that product is now used by the senior service for its nylon-and-worsted bunting for both ship and shore signalling.

Alembic

Germany's Big-Three Account for 40 per cent of Exports

But Output only $\frac{1}{3}$ of Chemicals Total

SALES of the West German chemical industry last year totalled DM 15.43 milliard. The leading enterprises—Bayer, BASF and Hoechst—contributed DM 4.52 milliard, or 29.3 per cent of total sales. These figures show that the 'big three' accounted for barely one-third of the 1956 turnover of the German chemical industry, writes our special correspondent.

Commercial initiative therefore proved as successful among small and medium-sized firms as among the largest. In view of the special importance of exports to large-scale chemical producers, it is interesting to note that the share of the 'big three' in chemical exports from the Federal Republic is particularly high; they shared total exports worth DM 1.60 milliard, or 41 per cent of the total chemical exports of DM 3.91 milliard.

Raw Materials Scarcity

Essential from the point of view of competition in the chemical trade are raw material sources. In this respect, West Germany, apart from coal, is poorly situated. The German phosphorus industry, for instance, must pay 10 times as much for imported crude phosphates as US competitors. Similar conditions prevail in the important petrochemical field, compared not only with the US, but also recently with Italy and France. The Montecatini combine, which has access to the rich natural gas deposits in the Po valley appears in the world market for chemicals as an increasingly strong competitor to German products. More recently the French chemical industry has been given a most valuable trump card by the discovery of highly productive natural gas deposits at Lacq, Pyrenees (see the report of our French correspondent, page 1047).

France will in future rely increasingly on these natural gas reserves and extend her production of chemicals based on methane. It is expected that an extra one million tons a year of elementary sulphur can be obtained at low production costs from this source.

In contrast, West Germany has to offset her scarcity of raw materials by new projects so as to be able to stand up to this competition inside the projected common market. Substantial investments are the prerequisite of progress through research. But because the German capital market, owing to the finance and tax policies of past years, operates only on a limited scale, the heavy investment and research expenditure needed can be undertaken only by companies with a share capital high enough to finance such expenditure out of their own resources.

The pace of expansion is reflected by the following table that appeared in the

May 1957 issue of *Die Chemische Industrie*:

		Bayer	BASF	Hoechst
Sales ...	1954	1,210	1,050*	1,127
	1955	1,437	1,261*	1,270
	1956	1,596	1,498	1,481
Exports ...	1954	448	374	338
	1955	546	462	380
	1956	636	520	448
Capital Expenditure	1954	186	172	136
	1955	236	265	241
	1956	269	287	240
Depreciation ...	1954	97	87	73
	1955	132	104	104
	1956	171	118	129
Research ...	1954	50	53	64
	1955	62	66	69
	1956	77	75	81
Share Capital ...	1954	388	340	286
	1955	388	510	385
	1956	550	510	462
Net Profit†	1954	33	27	24
	1955	36	38	33
	1956	55	51	43

The sales increase ranking of the three

companies last year differed from the preceding year. Hoechst raised its sales by 16.6 per cent, against 12.7 per cent in 1955, Bayer by 11 per cent, against 19 per cent, and BASF by 10 per cent, against 20 per cent in 1955. All three have been recording a bigger increase in exports than in domestic sales during recent years. The results achieved in overseas business, in particular, have been effectively assisted by consolidation of market positions through extension of foreign subsidiaries and manufacturing bases as well as, up to a point, by royalties from licences.

As long as foreign trade is hampered by import restrictions and foreign exchange difficulties, the task of German economic policy will be to make exports attractive. Our German contemporary calls for Government support, through tax allowances on depreciation, for the export of the capital needed to set up chemical plant in overseas countries and to enable financial participation in foreign companies. In this respect it is stated that foreign chemical firms competing in Latin America, are in a substantially more favourable position than their West German counterparts.

* Sales by subsidiaries not included.

† Net profit figures indicate the sums needed to pay ordinary dividends of 8, 9 and 10 per cent respectively distributed by the three companies for 1954, 1955 and 1956 and in no way express the net earnings which have not been disclosed.

Ciba Report Gradual Reductions in Profit Margins

At the annual general meeting of Ciba Ltd., Switzerland (see *CHEMICAL AGE*, 8 June, p. 973 for details of turnover) the chairman, Dr. R. Käppeli, stated that by rationalising production and by improving processes, it had been possible to a certain extent to balance the growing discrepancy between costs and earnings. In spite of this a gradual reduction of the margin of profits on their products had proved inevitable.

Research in the dyestuffs field had undergone a reorientation with increased stress on problems of application. Success in the field of plastics was mentioned particularly.

The company's large investments in pharmaceutical research had paid. There had also been interesting and promising research results in the field of plastics. Chemistry of colour photography was another field of research. Recent developments, said Dr. Käppeli, had led to greatly increased demands being made on the materials being used in industry, and had resulted in a new chemistry of rare metals and metals of extreme purity.

Chemical industry had to keep abreast of the latest technical achievements. Considerable funds were required even for preparatory studies, however, and Dr. Käppeli considered that in the long run it would only be possible for the industry to maintain its position by utilising its resources to the utmost.

Vice-chairman, Dr. A. Wilhelm, reported that demand for dyestuffs dropped greatly during the first six months of 1956, but business had recovered noticeably during the second

half of the year. Expansion in the plastics field had made good progress during the year, but growing import barriers had led to the manufacture of these products being shifted in an increasing degree to plants outside Switzerland. Production based in this sector will be broadened as a result of the establishment of the Société des Produits Chimiques de l'Allier (Prochel) in France jointly with the Société Anonyme des Glaces et des Produits Chimiques de Saint-Gobain, Chauny et Cie.

Regarding research expenditure, Dr. Wilhelm reported that cost of the increased research in dyestuffs, plastics and pharmaceuticals rose from a total of S.fr. 19 million (£1.6 million) in 1947 to S.fr. 42.3 million (£3.5 million) during 1956, a rise of just under 120 per cent of which over two-thirds was devoted to pharmaceutical research.

The group's employment rose by 229 during the year and totalled 18,763 at the end of 1956. About a third are employed in Switzerland. The British company accounts for 2,963 and 3,039 work in the North American companies.

Net profit for the year totalled S.fr. 22,461,372.39 (£1,834,330) which with the balance of S.fr. 1,815,768.10 (£148,286) brought forward from the previous year, produced a total of S.fr. 24,277,140.49 (£1,982,616) available for distribution. The company propose to distribute S.fr. 108 million (£1,176,000) as statutory and supplementary dividends amounting to 18 per cent. A balance of S.fr. 1,679,265.01 (£137,139) has been carried forward.

ICI PLAN FOR EXPANDING CHEMICAL INDUSTRY FUTURE

Sir Alexander Fleck at AGM

WITH ICI turnover in 1957 already running higher than the record figure of £435 million last year, Sir Alexander Fleck, chairman of Imperial Chemical Industries Ltd. in his speech at the annual meeting on 13 June, took a confident view of the future. If there were no unforeseen international disturbances, 1957 should be a year of high activity in almost every branch of the company.

Sir Alexander also regarded the longer term prospects confidently saying 'There are great possibilities for the profitable development of the chemical business throughout the world; and we have available in this country many of the raw materials required, convenient of access and of high quality. . . . It is our policy to plan for the future in the expectation that we shall not only maintain, but indeed improve, our place in the chemical industry of the world.'

Last year the company's construction programme had taken a record £44 million; expenditure on fixed capital assets this year was expected to reach £50 million. To finance completion of projects already sanctioned by the group would cost a total of £100 million, of which £83 million was attributable to the ICI operating divisions and to Wilton Works.

In addition to projects covered by those figures, many schemes were still in the planning stage and would receive detailed study in the next two or three years. ICI were already considering how they might further extend capacity to produce those products for which a rapid expansion in demand could be foreseen.

Terylene Extensions

Outstanding in the list of major extensions was Terylene; ammonia and derivatives, such as fertilisers; light and heavy soda ash; chlorine and products containing chlorine such as p.v.c.; di-iso-cyanates and other products for which a rapidly growing demand was expected.

Sir Alexander made the point that some 52 per cent of the £44 million of capital expenditure sanctioned in 1956 was being spent on developing 15 products which were either not on the selling range in 1945 or which were then only in pilot scale production. Although this figure might vary, there was no reason to suppose that this movement would not continue.

Present experience showed that total costs of constructing new production units corresponded to an average expenditure of some £12,000 for each individual who would be concerned with their operation and administration.

If ICI were to hold their place in a dynamic and rapidly changing world, it was essential that every proper opportunity for growth and development should be seized. The chemical industry was in the forefront of that movement, but because it depended so directly on scientific pro-

gress and was expanding so fast, a high rate of capital investment was inevitable if production was to be adequate in quantity and if their efficiency was to be raised continuously to meet overseas competition. Against that background, ICI gave general support to the proposed European free trade area. Sir Alexander mentioned that one of the major tasks of the newly created economic planning director, Mr. J. L. S. Steel, would be to consider the impact of that development on the company.

Referring to what he termed changes that occurred progressively in the balance of employment, Sir Alexander said that the proportion of staff to payroll workers now stood at 1:2.3. When the company was formed in 1926, the ratio was 1:4.1 and the proportion of staff had been rising ever since. That did not mean a decrease in their hourly paid labour force, which had in fact gone up approximately 70,000 to 80,000 in the past ten years. It meant, however, a much more rapid relative increase in the monthly paid staff, which had grown

from 23,000 to 35,000 in the same period. At the same time, volume of production had more than doubled as a result of the vast expenditure of capital backed by that changing pattern of organisation.

Of the 7,800 male managerial staff, no less than 5,800 were scientific and technical, and the proportion was growing year by year. Because the company would require ever greater numbers in the future, they welcomed the steps being taken to expand technological and technical education.

Of the company's price policy, which had been to peg prices of most of their products until 1 July 1957, Sir Alexander said that each product would in future be considered on its merits and prices would be adjusted up or down as demanded by cost and market conditions.

He referred at some length to the burden of increased costs which, despite a record turnover, had meant a drop of about £3 million in the group's manufacturing and trading profits last year. The current year was bringing its own problems. But fortunately the general level of activity was high and in most cases new plants coming into production were immediately and fully occupied. So far in 1957, exports had been of the same order as last year, but if UK production costs continued to rise at a rate greater than those of their principal competitors, it would become more difficult to place exports.

Laing-Ferguson Link for Complete Chemical Engineering Service

A SEPARATE association in the name of Laing-Ferguson is being formed by John Laing and Son Ltd., and the HK Ferguson Co. of Great Britain Ltd., to provide a 'complete and comprehensive construction service to the chemical, processing and manufacturing industries.' A new company has not yet been formed. The address of the 'association' as it is termed is 'London NW7.'

Announcing this development, the two companies say that the integration of all aspects of construction under a single controlling responsibility has already proved a means of achieving a significant and much needed speed up of completion schedules in this class of work. Both organisations have established a reputation for completion on time which, it is added, 'is the real measure of the final cost of new plant construction.'

'Notable Projects'

Notable industrial projects completed in recent years by the Laing organisation include the twin atomic piles in West Cumberland for Britain's first plutonium-producing establishment, heavy foundations for the cold reduction mill at the Abbey steel works, Margam, extensive construction work for UK oil refining and petrochemical industrial, and mills, factories, process plants, and research installations. In Africa the company has played a leading role in the construction work of uranium plants and gold mining plants.

The Ferguson company is a subsidiary of the HK Ferguson Co. of America, which has become well known for its experience in providing complete process plants, manufacturing plants and laboratories in India and the Far East, South America, Canada, New Zealand, West Europe and the US.

Work handled has included the installation of special purpose process and manufacturing plants, particularly petrochemical and chemical plants, including chlorine, caustic soda and soda ash, synthetic fibre, soap and synthetic detergent facilities, pulp and paper mills, steel mills, cement plants, power installations and mineral processing plants.

Already established in this country, the UK subsidiary has worked for such companies as Thomas Hedley and Co. and for Imperial Chemical Industries. They have also collaborated with John Laing and Son on the Ford Motor Co.'s new foundry—a joint venture that has developed into the new Laing-Ferguson association.

Next IEA Exhibition will be International

The next Instruments, Electronics and Automation exhibition, to be held at Olympia, London, from 16 to 25 April, will be international in scope for the first time. The organisers are Industrial Exhibitions Ltd., 9 Argyll Street, London W1.

LACQ NATURAL GAS SPELLS WEALTH FOR FRANCE

By our French Correspondent

LAST month, a new page in the history of the industrial development of France was written with the first delivery of refined natural gas from the plant at Lacq to the country's pipe-line network, writes our French correspondent. Behind this, lies a tough, long battle, fraught with so many technical difficulties accruing from the terrific bottom-pressure of the local deposits and the high sulphurous content of the gas.

The Lacq plant has cost Fr. 3.5 milliard. With another Fr. 100 milliard forthcoming, its initial floor-space will be boosted ten times within five years, and its production, twenty times. The first stage involves the extraction from six wells of a million cu.m. of crude gas and 650,000 of refined gas a day. The refining process has already begun yielding gasoline, butane, ethane and sulphur.

A second stage of the project, capable of treating 5 million cu.m. of natural gas per day, representing over 3 million cu.m. of refined gas, will go into production in the second half of next year. As more wells are spudded—100 in all are scheduled—10 million cu.m. of crude per day will be treated by the end of 1959, and ultimately 20 million cu.m. per day in 1962. This daily output will represent 4 milliard cu.m. of refined gas a year, that is, three times the country's total gas consumption in 1955. This production will add up to 6 million tons coal-equivalent, or about 5 per cent of France's over-all energetic consumption, amounting to the equivalent of 123.5 million tons coal for 1956.

First Shipment

At the beginning of June a first shipment of 700 tons of Lacq sulphur reached the Progil refineries at St.-Clair-du-Rhône. The first stage of the project involves the production of 55,000 tons of sulphur per year, or one-fifth of the country's consumption. By the end of 1959, this source will cater for nearly all these refineries' yearly consumption of 275,000 tons. Thus, they will be freed from the necessity of importing 250,000 tons of unrefined sulphur from the US thus saving precious dollars; and importing 300,000 tons of pyrites from Cyprus and Spain. In 1960 Progil's 550,000 ton yearly output will actually leave a sizeable surplus available for export. By 1962, with a 1,200,000 yearly production from Lacq alone, the company will rank among the major world-producers of this commodity.

The Lacq gas is to be sold Fr. 5 the cu.m. in the fourteen depressed south-western French departments as against Fr. 6 in the rest of France. This is meant as a premium to encourage the construction on the spot of new chemical plants, relying on the by-products of the refining of natural gas for raw materials. The local plants already in existence are making preparations to enlarge

greatly their facilities and the range of their products.

For the Government-controlled Office National Industriel de l'Azote, known as ONIA, the Lacq gas is particularly valuable, coming at a time to offset the partially depleted local St. Marcet methane deposits, the exploitation of which will be abandoned in the none-too-distant future. The office's Toulouse works was constructed in 1924 and made use of the Haber process of ammonia synthesis. It has blossomed into one of the largest ammonia producers on the Continent, and the largest in France, accounting for 25 per cent of French output of azote products.

From an initial production of 120 metric tons a day of ammonia, the Toulouse plant has jumped to 400 tons a day. This will be boosted to 500 tons a day next year, corresponding to a yearly production of 580,000 tons of fertilisers. The novel sources of gas supplies will allow it eventually to treble this production.

within the framework of the Monnet plan of equipment and modernisation. It should be noted in this connection that Germany uses per acre two and a half times as much of chemicals as France, and Belgium, Holland and Denmark, three times more. Furthermore, the use of chemicals in the predominantly agricultural south-western area lags far behind the national average. Thus, this greatly expanded output should find a ready market on the home market, and especially so if mass production lowers prices.

The big source of cheap power afforded by Lacq is that it will create in the near future a heavy industrial concentration in its immediate vicinity. France's electricity board, known as EDF, is breaking ground here for a 125,000 kW thermal plant, relying on gas to power it. As a sequel, Pechiney, the biggest French aluminium producer, will have in operation here by 1960 an aluminium electrolysis plant with a 50,000-60,000 ton yearly capacity, representing well over one-third of the country's current output of aluminium.

It is reported that the American chemical industry might also join in the big rush, especially Monsanto, which is gradually obtaining a big stake in Europe, and Reichhold Chemicals, which operates 23 plants in 19 countries outside the US, even if it only holds minority interests in all but three of these.

Plastics Industry Grants for Courses in Chemistry

TRUSTEES of the Plastics Industry Education Fund have made grants to a number of technical colleges. A second scholarship worth £300 a year tenable for three years has been granted for the full-time course leading to the Associateship of the Plastics Institute at the National College of Rubber Technology.

An allocation of £1,000 has been made to the Borough Polytechnic, London SE1, to continue payment of bursaries to boys entering the second year of the diploma course and to enable further bursaries to be given to boys leaving school this summer. The trustees have also offered Borough Polytechnic £1,000 for the award of four annual scholarships to enable 'college-based' students without grants from their employers or local education authorities to take the four-year sandwich course in applied chemistry and chemical technology, group A plastics, which is to start next September for the award of the new diploma in technology.

A further £650 a year has been set aside for five scholarships for 'college-based' students taking the four-year sandwich course in plastics technology due to start next year at the Birmingham College of Technology. In addition, the trustees are providing £1,000 for three scholarships at the Birmingham College of Technology for the one-year post-graduate diploma course in high polymer technology.

At Acton Technical College the fund is already financing a research studentship in plastics technology which is being

continued for a second year. At this college also for 'college-based' students taking the sandwich course in applied chemistry with plastics chemistry as their special subject, the trustees are making two awards each of £100 annually for four years.

The trustees have again allotted £1,000 for training grants to young people working in the plastics industry so that they can study full time.

Durham Raw Materials to Market GR-S

SOLE selling agents in this country for the products of Goodrich-Gulf Chemicals Inc., of the US, are now Durham Raw Materials Ltd., 1-4 Great Tower Street, London EC3. By agreement they have taken over from the previous agents, British Geon Ltd.

Goodrich-Gulf claim to be the largest US producer of GR-S synthetic rubber and supply all the normal varieties under the trade name Ameripol. Plans are advanced for preliminary production of Ameripol SN which is a new synthetic rubber of exactly the same chemical constitution as natural rubber.

Wills

MR. JOHN LLOYD LORD, senior partner of John L. Lord and Sons, acid-resisting cement manufacturers and chemical engineers, Bury, a former Mayor of Bury, ex-Alderman and retired justice of the peace, who died on 3 November last, left £18,914 net.

USES OF ISOTOPES SHOWN AT BIRMINGHAM EXHIBITION

AN EXHIBIT sponsored by the UK Atomic Energy Authority was the highlight of the Safety and Factory Efficiency Exhibition, held at Bingley Hall, Birmingham, from 14 to 21 June. Entitled 'Atom 1957', the exhibit gave a comprehensive picture of the authority's work, and included a section on the safety precautions used to guard against the dangers of radiation.

Centrepiece of the exhibit was an animated model of Calder Hall, Britain's first atomic power station. Another section dealt with the uses of radioisotopes, and included some of their newer applications.

Photographs and models showed how radioisotopes are used for oil well logging, for detecting flaws in castings, for package monitoring, for measuring sheet thicknesses; in the development of wear resisting lubricating oils, for plant breeding and fertiliser and insecticide research, for tracing the mudflow in rivers, and for many medical applications.

The section of the exhibition which dealt with safety precautions against radioactivity showed examples of heavy shielding in industry and laboratories, and demonstrated how workers handle radioactive materials in ventilated boxes. A full range of protective clothing was displayed, together with instruments used to check on the amount of radioactivity in the atmosphere and in the laboratory.

An illuminated exhibit showed how an ordinary laboratory can be adapted for use with radioactive materials. Measures suggested are the improvement and extension of the air extraction system, the use of impervious surfaces to prevent absorption, the fitting of flush stainless steel sinks and flush light fittings, and the elimination of crevices.

The remainder of the exhibition covered all aspects of industrial safety. Several firms exhibited protective clothing of all kinds, and other exhibits included machine guards, dust extraction plant, fire extinguishers, lifting gear and a variety of creams to combat skin irritants.

Altogether there were 60 stands at the exhibition, which was the largest so far organised by the Birmingham and District Industrial Safety Group. The group organise the exhibitions biennially, and this was the fourth of its kind.

When the exhibition opened, Mr. R. Bramley Harker, HM deputy chief inspector of factories, the exhibition chairman, said its aim was to educate firms and workers in the need for safety in factories. It had been estimated that the loss to industry through industrial injury was twenty million man days a year. Three-quarters of the accidents were not due to any breach of the law, but occurred because the worker did not fully understand the dangers.

It was hoped that workers who visited

the exhibition would see for themselves the importance of safety, while management representatives could pass on the lessons they learned from the exhibition to their workers. Mr. Bramley Harker, said, 'We aim to give knowledge to people to enable them to take care of themselves. The slogan is, "Take care of yourself. Nobody can do it for you."'

FOR YOUR DIARY

MONDAY 24 JUNE

SAC—St. Andrews: until 28 June. Symposium on 'Modern analytical chemistry in industry'.

WEDNESDAY 26 JUNE

SCI (Food Group)—London: 14 Belgrave Square SW1, 6.30 p.m. 'New developments in the freeze drying of meat' by Dr. W. R. Smithies.

Oil Films shown to Shell Petroleum Employees

FOR THE third year running the Shell Petroleum Co. Ltd. staged a film programme for their staff at a special showing at the Dominion Cinema, Tottenham Court Road, London W.1, recently.

The films shown were 'Shell-1956,' a colour filmstrip covering the trading results of the Royal Dutch-Shell group for the year, 'Look at Your World,' the latest issue in the series of Shell film magazines, which summarises the history and development of Shell's enterprises during the last half century, and 'Song of the Clouds,' the latest production of the Shell Film Unit. Made in Eastman colour for wide screen presentation, its theme is 'air in the service of mankind,' and it was due to be shown at the Cork Festival.

Plastics and Titanium Analysis Discussed

TWO PAPERS were read at a meeting of the Society for Analytical Chemistry, western and midlands sections, held in Cheltenham on 31 May and 1 June. They were: 'Recent advances in the analysis of plastics' by Dr. J. Haslam (ICI plastics division) and 'The analysis of titanium, zirconium and their alloys' by W. T. Elwell (ICI metals division).

£263 for Crushed Toe

Mr. Oliver Hind, a chemical worker, who recently sued Robert Dunham a haulage contractor and his employers, British Chrome and Chemical Co., following a works accident in which his toe was crushed has been awarded damages of £263 16s and costs at Durham Assizes. He was unloading a lorry at the firm's Eaglescliffe when a side board fell on to his left foot. His claim against the company was dismissed.

Repairing a Calcium Chloride Retort by the Metalock Process

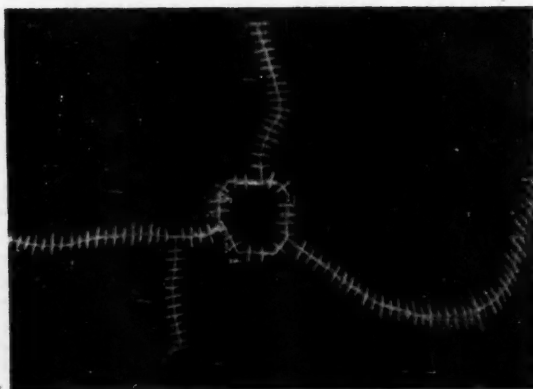
ALARGE retort used for bringing calcium chloride to a temperature of between 300° and 350°, at the Chemische Fabric Kalk, in Cologne—Kalk, was recently repaired by Deutsche Metalock GmbH. Weighing 15 tons and measuring 13 ft. long, 6 ft. 6 in. wide and 5 ft. 11 in. high, it is made of a special cast iron having a high alkali resistance.

Cracks of up to 25/64 in. were caused when refilling the retort by fluctuations of temperature in the oil firing system which at times reached about 2,200°F. Before the repair, two 5/16 in. Metalock keys and a 3/4 in. Metalace stud were immersed for 32 hours in the boiling cal-

cium chloride to test alkali resistance.

From the test it was computed that, with the retort in full operation, the life of the top keys in the repair would be one year. The customer agreed to the top keys being renewed after that period. A 13 3/4 in. by 11 13/16 in. was cut out at the intersection of the cracks and a new insert of alkali resisting cast iron 'metalocked' into place.

Total working time for the repair was 405 hours. After a similar repair undertaken two years ago, it was established that the repair had withstood stresses of heat and corrosion and that the expected deterioration had not taken place.



Repair work on the lower part of a retort at the Cologne-Kalk chemical factory

Overseas News

DUTCH CHEMICAL PLANS INCLUDE NEW POLYTHENE PLANT

EXPANSION of productive capacity is referred to in the 1956 annual report of the Dutch Staatsmijnen in Limburg. New plant for the production of nitrogen, put into operation towards the end of the year, increased daily output to 500 tons, making the nitrogen works one of the world's largest. Extractions from coke oven gas produced a further 9,000 tons of nitrogen; by far the major portion of the total nitrogen output was processed into fertilisers, production of which totalled 750,000 tons. Lime ammonium saltpetre still accounted for 77 per cent of the total nitrogen consumption.

Sales of chemical products through the Ned. Verkoopkantoor voor Chemische Producten NV, Amsterdam, rose by 9 per cent and 58 per cent of the tonnage sold was exported. Output of pure benzene hydrocarbons rose from 9,000 tons in 1955 to 21,000 tons last year.

Among organic products, caprolactam, starting material for the nylon products made by Algemene Kunstzijde Unie NV, was now taking the principal position. Production in 1956 amounted to 3,800 tons, an increase of 26 per cent. A further expansion of the caprolactam factory is in hand.

Plans for a new polythene plant are now at the stage where construction is expected to be started shortly. A pilot plant will deliver its first products during 1957.

During the year, Staatsmijnen paid the last instalment of their fl. 4 million investment in the NV Nederlandsche Soda-industrie, which amounted to 70 per cent of that sum.

Montecatini Sicilian Fertiliser Plant Project

At Campofranco, north of Agrigento, Sicily, Montecatini Chemical group are building a new potash fertiliser plant which will meet all of Italy's requirements of potash fertilisers. Hitherto, Italy has been dependent on imports for this type of fertiliser. This plant, it is estimated, should save about £2.3 million a year in imports.

Rights to US Chlorine Dioxide Generators Acquired

Fischer and Porter Co., 50 Jacksonville Road, Hatboro, Pa., US, instrument and chemical equipment manufacturers have acquired all sales and manufacturing rights to equipment developed by the Olin Mathieson Chemical Corporation of New York for generation of chlorine dioxide from sodium chlorite. Involved in the transaction are a generator for producing chlorine dioxide in water solution, used principally in water treating plants, and a generator for the production

of chlorine dioxide gas, used in the bleaching of fats, oils, and similar materials.

The transaction does not include the Mathieson process for chlorine dioxide generation from sodium chlorate, widely used in the bleaching of pulp in the paper industry.

Electron Radiation Centre Opened in Cologne

A new electron radiation facility, established to encourage ionising radiation applications for research and industrial processing, was opened in Cologne on 19 June by Leybold-Hochvakuum Anlagen, GmbH, and High Voltage Engineering Corporation of Burlington, Massachusetts, US. Incorporating a 2-million-volt, 0.5 kilowatt Van de Graaff electron accelerator, this radiation centre is said to be the first in West Europe to be made available on a commercial basis to industrial research workers for experimental and limited production programmes.

High Voltage now has nine foreign sales and service organisations spread across both hemispheres. About half its 1956 business volume came from outside the US, where over 35 particle accelerators ranging from one to six-million-electron volts are being used by universities, hospitals and research laboratories.

New Basic Chemical Plant in Mexico

Sosa de Mexico SA, a new company formed in Monterrey, are to produce 6,500 tons of chlorine, 7,300 tons of 'rayon' grade caustic soda and 3,000 tons of DDT a year. It is hoped to start production by the end of 1957. The US Dow Chemical Co., through their recently acquired subsidiary Sales Alcalis SA are to set up a plant near Coatzacoalcos to produce alkalis, caustic soda, chlorine and derivatives.

Finnish Fertiliser Industry in 1956

In 1956, Finnish consumption of fertilisers totalled 676,000 tons. This corresponds to 65 kg of plant food per cultivated hectare. Since the enlargement of the Haryavalla sulphuric acid plant, the import of phosphate fertilisers has ceased; in 1956, however, imports totalled 44,000 tons. Raw materials for these fertilisers are still imported—raw phosphate from North Africa, apatite from the USSR.

The Typpi (nitrogen) Company is producing 32,000 tons a year, accounting for three-quarters of Finland's whole consumption. The use of mixed fertilisers is stated to be increasing. The Finnish Sulphuric and Superphosphate Company has

three fertiliser-mixing plants which are producing 300,000 tons of mixed fertiliser a year. The Typpi company has begun production of nitro phosphate-based mixed fertiliser; capacity for this is 65,000 tons a year. Production has also started at the Kotka granulation plant. In due course all mixed fertilisers are to be granulated in Finland.

Radioactive Dynamite

A possible new application for radioisotopes is their incorporation of a suitable isotope in dynamite as an aid in detecting unexploded charges in drill holes. The Canadian Department of Mines has been carrying out experiments to determine the strength of radioactivity that would be readily detectable. An isotope with a half-life of between 30 and 70 days was considered most suitable. The final one selected was antimony-124. This use of radioisotopes, it is considered, may serve as an additional safeguard under special conditions where other forms of inspection may be uncertain and the extra cost is warranted.

NSW Superphosphate About to be Doubled

Sulphide Corporation Pty. Ltd., a member of the Consolidated Zinc group, is to spend £A8 million in plans for zinc smelting and the development of sulphuric acid and superphosphate projects at Cockle Creek, New South Wales. Extensions to existing plant will increase output to 47,000 tons of zinc metal a year and superphosphate production capacity will be more than doubled to give a potential output of 430,000 tons a year.

The project will permit utilisation of the sulphur content of some concentrates that would otherwise be exported.

Chemical Visitors to Brazil

Two overseas chemical executives who recently visited Brazil were Baron Zerilli-Marino, head of the Italian chemical group, Ledoga-Lepetit, who discussed expansion of the company's activities in Brazil, and the vice-president of the US Reichhold Chemicals Inc., who discussed with the Brazilian company, Resana SA, the question of contracts for the manufacture of raw materials in Brazil for use in the synthetic resin industry.

Chilean Nitrate Lowest Output for Five Years

Production of Chilean nitrate last year, reported to be 1,159,000 metric tons, was the lowest for five years. The decline was chiefly due to the loss of 290,000 tons following a strike at the Anglo Lautaro Nitrate Corporation's plants. Belgium, Holland, Denmark and Sweden are said to have renewed their agreements for the purchase of nitrate and will pay in convertible currencies.

The Bank of London and South America report that negotiations for the

renewal of the trade agreement with France are being completed and that the French Government will undertake to grant permits for the import of 120,000 tons of Chilean nitrate during the year ending 30 June 1958.

ENI to assist Sicily's Chemical Industrialisation

The Italian State hydrocarbon enterprise's (ENI) proposal to the Sicilian Regional Government—that a new company to be set in Sicily by ENI should be granted a 446,510 acre exploration concession—has been accepted.

ENI is expected to take part in the general industrialisation of Sicily and it is reported that in particular plans have been drawn up to develop sulphur deposits and to form a local chemical industry.

A new allocation of £178,130 million has recently been provided by Bills introduced in the Regional Parliament. There has been a previous allocation of £47,370 million.

Production of Titanium from Hungarian Red Mud

Claims for greatly improved manufacture of titanium from red mud have been made by the Hungarian Metal Industries Research Institute (Magyanovar).

About 10,000 tons of the red mud are produced every year as a by-product of Hungarian aluminium manufacture. This mud contains iron and about 2 per cent of titanium dioxide. It is not known how the titanium is obtained but it is believed that the process used involves concentration to a secondary mud containing 20 to 22 per cent titanium dioxide, and then reduction in a Knoll-type operation. Final details on the process are to be completed this year.

Mexico's Increasing Capacity for Sulphuric Acid

Mexico now has 13 sulphuric acid plants with a total annual capacity of 194,000 metric tons, compared with an installed capacity of 63,145 tons in 1950. Production in 1956 totalled 161,483 tons and imports amounted to 2,628 tons. Fifty-eight per cent of production is used in the fertiliser industry. By 1960 consumption of sulphuric acid is expected to reach 240,000 tons and three new plants now in the planning stage are expected to provide the necessary increase in capacity.

Bohlen Chemical Interests Streamlined in Germany

Berthold von Bohlen and his brother Harald (two brothers of Alfred Krupp) have recently streamlined their chemical industry interests in West Germany. The Jurid-Werke AG, near Hamburg, with a share capital of DM 88 million, have been renamed Bohlen-Industrie AG, Glinda; this company controls the brothers' majority interests in WASAG-Chemie AG and Jurid-Werke GmbH. The former company controls, among others, the Rheinische Gummi-und Celluloid-Fabrik, Mannheim, and has majority sharehold-

ings in Guano-Werke, AG, Hamburg, and the Nitro-chemie GmbH, Munich. Jurid-Werke GmbH have taken over the production and sales programme of Jurid-Werke AG.

Berthold von Bohlen und Halbach becomes a member of the board of Bohlen-Industrie AG and his brother Harald a member of the supervisory board.

Pechiney Increase Sales and Productive Capacity

Pechiney, the French manufacturers of chemicals and electro-metallurgical products, report increased production capacity and rising sales for 1956. Turnover, after deduction of tax rose by 11 per cent compared with 1955. Exports represented 20 per cent of output against 22 per cent for the previous year. Output of aluminium increased to 127,228 tons, thus exceeding the previous annual record of 107,920 tons.

Steps were taken to expand existing capacity or in some cases, to begin the manufacture of metals such as titanium, zirconium, silicon and certain new alloys. Output of chemical products is also reported to have made good progress.

Net profits amounted to Fr. 1930 million (tax paid £1,085 million). A net dividend of Fr. 407 per Fr. 5,000 share is to be distributed.

New Sugar-Based Chemical

Octakis (2 - hydroxypropyl) sucrose obtained by reacting sucrose with propylene oxide, each hydroxyl group in the sucrose molecule reacting with a molecule of propylene, has been produced by Dow Chemical, US. According to Dow Chemical the compound, marketed under the trade name Hyprose SP 80, will be useful as a cross-linking agent for polyurethanes, or as a plasticiser. Esterification with fatty acids has produced esters which show promise as emulsifiers and detergents.

New Burmese Company will Make Basic Chemicals

A new private company, Electro-Chemical Industries and Trading Co. Ltd., of 78 Brooking Street, Rangoon, has been formed to manufacture basic chemicals. The enterprise will mainly hinge on a plant to manufacture caustic soda and its by-products, chlorine gas, hydrochloric acid and bleaching powder. Authorised capital is reported to be £187,500.

Texas to Build Nuclear Radiation Laboratories

What is claimed to be one of the world's largest and most fully-equipped nuclear radiation laboratories will be built at the Texaco Research Centre at Beacon, NY, US. Construction will start immediately and is expected to be completed by April, 1958. The laboratory will be equipped with three different radiation sources. It will house a 6-million-volt linear accelerator, the first of its kind in the petroleum industry; a 3-million-volt Van de Graaff generator; and a 35,000

curie cobalt-60 source of gamma radiation.

The cobalt-60 source, one of the largest of its kind in existence, has been under irradiation in the Canadian Chalk River national research experiment atomic reactor for the past three years.

The radiation laboratory was engineered by the Vitro engineering division of the Vitro Corporation of America in co-operation with Texaco scientists.

Synthesis of Fatty Acids by Means of Purified Enzymes

Higher fatty acids have been synthesised from 'labelled' acetyl-CoA by means of an artificial enzyme system including besides thiolase, β -hydroxy-acyl-dehydrogenase and crotonase, a new reducing enzyme, which can be isolated from animal liver or yeast. This work is reported by Dr. W. Seubert, G. Greull and Professor F. Lynen of the Max-Planck Institute, München (*Angewandte Chemie*, 1957, 69, 359).

Radioactivity studies, when using reducing enzyme from pig liver, showed that maximum radioactivity was not associated with long chain fatty acids, as had been expected, but with capric acid. It is stated that the reason for this was that caprinyl-CoA built up in the aliphatic series was largely split up by hydrolysis by means of an acyl-Co-deacylase contained in the enzyme preparation. Radioactivity was shown to increase with increasing chain length when an enzyme preparation from yeast not containing deacylase was used.

Dutch Exhibition of Nuclear Energy

An international nuclear energy exhibition is to be held at Schiphol Airport, near Amsterdam, from 1 July to 15 September under the title 'Het Atoom.' Exhibitors will demonstrate the peaceful uses of atomic energy and will include a number of Dutch nuclear equipment firms and scientific institutions. A 'swimming-pool' reactor purchased from the US will be demonstrated. The UK Atomic Energy Authority will have a large stand.

Blasting Agent from Ammonium Nitrate/Fuel Oil

The new blasting agent developed by Canadian Industries Ltd. and referred to in 'Overseas News' last week is a mixture of ammonium nitrate and ordinary fuel oil. The usual procedure is to pour the ammonium nitrate (in prilled form, the size and shape of birdshot) into boreholes and then add about one gallon of fuel oil for every 80 lb. of prills.

Synthetic Rubber Plant Planned in Holland

Holland is likely to have its first synthetic rubber plant in the near future, for the Royal Dutch Shell Co. are now seriously considering building a factory at Pernis, near Rotterdam. Dutch rubber manufacturers are increasingly using synthetic rubber and the percentage employed, now 15 per cent, is expected to rise.

Molybdenum Deposit Discovered in Southern Rhodesia

A molybdenum deposit discovered near Selukwe, Southern Rhodesia, is to be worked by a, as yet, unnamed South African company, who have secured an option for over £250,000.

Stated to be the largest molybdenum ore-body ever located anywhere in Africa, the deposit is five miles long and a mile and a quarter wide. It is reported that the Rhodesian Selection Trust Group is associated with the unnamed company. Engineers of this group are said to have reported so favourably that the option was secured without waiting for more detailed reports.

Organisation of Mexico's Chemical Industry

In Mexico, a National Chamber of the Chemical Industry has been formed which comprises 650 companies. The Mexican chemical industry has shown rapid expansion in recent years. Production in 1956 was 132,350 metric tons of chemicals compared with 43,374 metric tons in 1950.

Laboratory Equipment Sought

Laboratory glassware, thermometers and laboratory apparatus to an estimated value of Belgian Frs. 1.5 million are sought by Belgian Congo. Copies of the specification, No. 103, can be purchased from the Service des Approvisionnements due Ministre des Colonies, 1 rue de la Regence, Brussels, price B.Frs. 50.

Salt Refineries for Greece

The Greek Ministry of Commerce is studying the possibility of creating large-scale salt refineries in Greece. Estimates suggest that a production of 40,000 tons of a salt a year would be possible.

Six tenders have been submitted by foreign firms (US, Italian, French, Belgian and German) for the construction of the nitrate fertiliser factory at Ptolemais, the Minister of Co-ordination has stated. The project will cost \$30 million.

Nuclear Research Centre for Venezuela

A total of 167 million bolivares is expected to be invested by the Venezuelan Government in the installation of an atomic reactor for the production of isotopes and other radioactive agents. The project includes the building of 50 laboratories for research and it is hoped that this new centre will be opened at the end of next year.

Norway's 4-year Development Plan

The long-term economic development programme of the Norwegian Government for the four-year period 1958-61 foresees an average annual increase in total production of some three per cent. This takes into account the introduction of the 45-hour working week and assumes generally favourable world economic

conditions. Industrial production, it is estimated, will rise by 20 per cent over the four years.

Export industries, particularly the chemical and metallurgical sectors, are to be expanded considerably during the four-year period. Output of aluminium is expected to rise to about 170,000 tons a year by 1960, compared with 93,000 tons in 1956, as a result of expansion of existing plant and new ones coming into operation, such as that at Mosjøen, North Norway.

Dutch Chemical Subsidiary for Denmark

Dutch Chemical Factory, Naarden is preparing to establish a Danish subsidiary. Last year this company made a profit of Fls 1,626,000 compared with Fls 1,288,000. Dividend at 10 per cent remains the same as in 1955.

Chloroisocyanuric Acids to be Produced Commercially

Two solid chemicals with high available chlorine content, ACL-70 and ACL-75, resulting from basic research by Monsanto Chemical Co., US, in the fields of nitrogen and isocyanate chemistry are soon to be produced in greater quantities. The plant for continuous production of

di- and tri-chloroisocyanuric acids, is designed to produce multi million pounds a year. Experimental-scale process units have been in operation for two years. ACL-70 and ACL-75 are used as active ingredients in dry bleaches and industrial sanitising agents.

Reload System for Hot Atomic Fuel

It is reported that for the first time in the US, a method is now available whereby radioactive 'hot' fuel is reinserted into a 'loop facility' of a materials test reactor. It is known as a 'hot reload system' and has been developed by Knolls Atomic Power Laboratory.

Prior to this development, a new fuel sample was required for each test performed. The 'loop facility' simulates conditions under which fuel will burn in the power-producing plant for which it is designed. The present equipment makes use of a single fuel sample which can be employed through a complete series of experiments. The reload equipment allows one test to be halted, the fuel to be removed, and other materials to be inserted into the test reactor.

Cost of the system is stated to be about \$20,000. The savings on the first experiment have more than made up the cost of the system, it is reported.

Lummus Co. Announce Standard Building Block System

A SYSTEM of standardised schematic 'building blocks' on which typical process operations can be tested before commercial scale production is undertaken has been introduced by the Lummus Co. at their new engineering development centre, Newark, NJ, US.

The new facilities are available to the British chemical industry, state the Lummus Co. Ltd., whose offices are at 80 Regent Street, London W1.

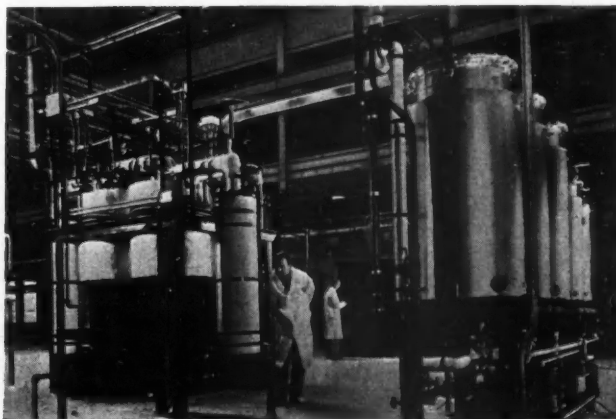
The company state that schematically, almost any new job can be considered as a series of relatively simple units. Typical unit operations, integral in all the complex chemical plants built today, include heating and cooling, distillation, fractionation, contacting, filtration and solvent extraction. Unit processes include oxidation, reduction, catalytic cracking,

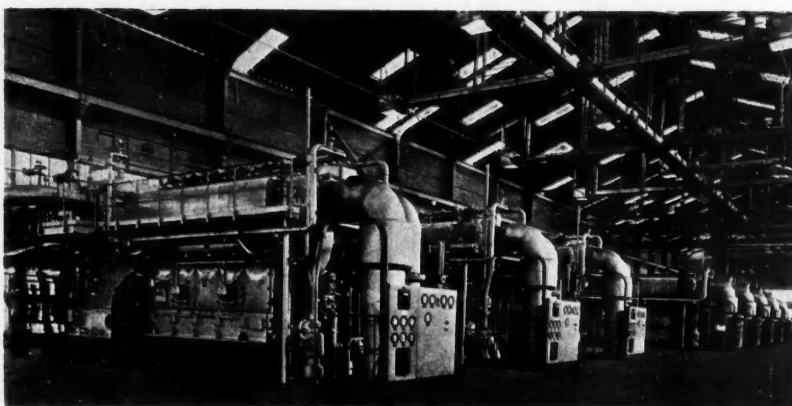
esterification, hydrogenation and polymerisation.

The same schematic 'building blocks' are used with only slight variations in all process industries. The approach, says the company, permits concentration on one part of the job at a time. It also permits translation of previous experience and technology on similar blocks.

These facilities are said to provide the means of proving new processes and of projecting accurately the expected yield once a new facility goes on stream. Lummus leave basic chemical research to their customers; the company's concern is with the translation of laboratory results to productive reality. The new facilities are said to make possible on many jobs the projection of actual productive yields to within ± 0.01 per cent.

Use of these new Lummus 'building blocks' is said to permit accurate analyses and projections of chemical process yields based on all sizes of samples—from one cc. to a tank-car load





Eight of the 13 National engines in the large compressor house at Wilton

New Olefine Power Unit Uses First Turbo-charged Dual Fuel Engines

FIRST engine-driven compressor group in the UK to make use of turbo-charged dual-fuel engines has been installed in the No. 2 olefine plant at the Wilton Works of Imperial Chemical Industries Ltd. It is also the largest engine-driven compressor group of its kind in this country.

The olefine plant is powered by 13 diesel and dual-fuel engines each driving a compressor, supplied by the National Gas and Oil Engine Co. Ltd., Ashton-under-Lyne. The National prime movers total 11,059 b.h.p. on a 12-hour rating and include engines from the F4A, B4AU and B2AUP ranges. There are four separately mounted engine-compressor

groups in the 380 ft. by 85 ft. compressor house. Although one set in each group may be a stand-by, all the sets may be needed at any time to provide optimum efficiency in the process of converting naphtha to olefines.

A striking degree of automation in engine control has been achieved for only one man is on duty in the compressor house on each shift. Safeguards are provided in the form of visible alarms which also have audible 'reinforcement.' An extensive waste-heat recovery system is installed to cater for a wide variety of demand in other parts of the plant.

The plant was designed by and erected by M. W. Kellogg Co. of New York.

Durham Colleges Launch £250,000 Appeal to Expand Science Facilities

AN APPEAL for £250,000 was launched on Monday by the Council of the Durham Colleges in the University of Durham. A programme of expansion, that will cost at least £2 million to complete, is planned to provide the necessary buildings and equipment, especially more laboratories and more residence for students, to bring the total numbers from the present figure of 1,300 to 2,000, and the numbers in science from the present figure of 400 to 1,000.

The University Grants Committee have approved the programme and the colleges hope that by raising £250,000 from private sources the Grants Committee will help them towards fulfilling the programme.

A message from Sir Alexander Fleck, chairman of ICI Ltd., and a member of the council of the Durham Colleges, was read on Monday at a conference held in London to launch the appeal.

Sir Alexander said he had 'a very real belief in the capacity of Durham Colleges to make an increasing contribution to the quality and quantity of scientific education in Britain.

'Each of our universities has its own particular way of making its contributions, but I always feel that the whole setting of Durham Colleges gives to them

a unique opportunity for good use of extended facilities. The blend of tradition stemming from St. Cuthbert and from the Venerable Bede with modern facilities for science teaching, set round Durham Cathedral and Castle, is a fine stimulant for a balanced education to be readily and steadily attained.'

Durham Colleges are founding, and this year starting to build, a new college for at least 200 men. So far, money is only available for the first third of this project.

A starting date in 1958 has been fixed for a new block of laboratories to house the departments of chemistry and geology, thus releasing space for physics and other science departments. The colleges' own contribution to this project must be raised from the appeal.

Present work in electronics is to be expanded into a separate department of applied physics, for which the provisional starting date is 1959. It is intended that the applied physics building shall be the first part of a greatly enlarged physics department. Here too, the colleges' contribution to the cost must be raised from the appeal.

Money is also badly needed to expand existing research projects. If this can all be achieved, there will still be need for

500 more residential places, for women as well as for men, and for the necessary enlargements of the students' unions.

A gift of £50,000 has already been promised by the Sir James Knott Trustees, suggesting that it should be applied to the research needs of the physics department. A further gift of £5,000 has been given by Mrs. M. S. Gordon, a member of the colleges' council, to commemorate the interest taken in the colleges by her husband, the late Bishop Geoffrey Gordon.

Determination of Silicon in Titanium and Titanium Alloys

A COLORIMETRIC METHOD is described by M. Codell and G. Normitz (*Analytica Chimica Acta*, 1957, 16, No. 4, 327) which is stated to overcome the errors due to attack of glassware by fluoboric acid and interference caused by a greenish colour produced when the titanous ion was oxidised with potassium permanganate, the critical effect of temperature, and a variation in slope of two calibration curves prepared for high and lower ranges of silicon content.

With the new colorimetric method, the sample was dissolved in hydrofluoric acid using a plastic bottle, boric acid was added and the greater part of the titanium was oxidised with hydrogen peroxide before addition of the permanganate. After precipitation of the titanium, the molybdenum colour was developed at $23^{\circ}\text{C} \pm 1^{\circ}$. This method is recommended for silicon contents of 0.003-1.5 per cent.

A satisfactory gravimetric method is also reported by these workers. The sulphuric acid dehydration method gives inaccurate results, it is stated, due to the presence of a residue of Ti_2Si_2 , which is resistant to sulphuric acid when the silica precipitates are ignited; the presence of these precipitates of occluded titanium salts which undergo indefinite changes; and the tenacious retention of sulphur trioxide by titanium sulphate produced when silica precipitates. These errors can be eliminated, according to Codell and Normitz by fuming the sample with sulphuric acid, fusing the silica with sodium carbonate and dehydrating with perchloric acid. The method is recommended for silicon contents of 0.3-5 per cent.

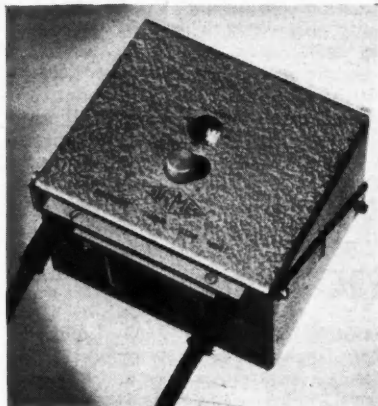
Producing 'Iron Coke' from Coal and Fine Iron Ore

August-Thyssenhütte AG, Duisburg, in conjunction with a coal-mining company are experimenting with a new process designed to produce 'iron coke' from a mixture of coal and fine iron ore. The process involves the grinding and mixing of long-flame gas coal with fine Swedish iron ore in a special installation erected at Walsum. An addition of 2-3 per cent oil is made to the mixture which is then processed in a coking plant to produce the 'iron-coke.' Particular importance of this work lies in the fact that for the first time a high-quality blast furnace coke can be made out of long-flame gas coal without the use of lean coal or fat coal.

**INDUSTRIAL
PROCESS
TIMER**

TIMED switching facility for industrial control purposes, process timer type N.237, manufactured by Airmec Ltd., High Wycombe, Bucks, is provided with two time ranges, one to 10 seconds and 10 to 100 seconds.

The timer resets itself automatically. Two timers may be operated back-to-back so that when the timed period of No. 1 ends it starts the timed period of No. 2.



Airmec process timer

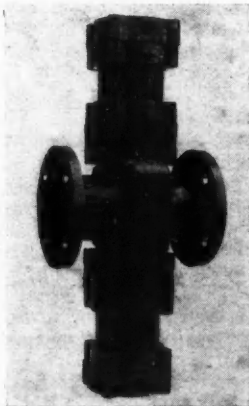
Similarly, when the timed period of No. 2 ends it restarts timer No. 1. This process will repeat continuously.

Two or more timers may be operated in tandem. In this case each timer is started by the previous one until the end of the chain is reached. Three or more timers may be operated in a ring. The system is similar to the tandem connection but the last timer is arranged to restart the first so that the process continues indefinitely.

Scale calibration accuracy is quoted as better than — 3 per cent and the repetition accuracy is claimed to be higher.

**AIR-OPERATED
PINCH
VALVE**

WARREN - MORRISON pinch valves for the chemical industry are now available for both air and electric operation. Basic design consists of a rubber tube with a clamping mechanism, housed in a metallic body. The tube, which isolates the medium handled from the metal body and working parts is available in a wide range of natural and synthetic rubbers, suitable for a variety of corrosive substances.



Warren-Morrison air-operated pinch valve

EQUIPMENT REVIEW

Chemical Plant : Laboratory Apparatus Safety and Anti-Corrosion Products

Designed without protrusions or pockets, it provides a straight through unobstructed flow, thereby eliminating clogging and reducing wear when handling abrasives. This design is said to be particularly suitable for handling powders in bulk or in suspension in air, as well as thick abrasive, slurries, sludges etc. The lining is easily replaceable.

Two air operated pinch valves are now in production, one for on/off duties and a newly introduced design providing flow control. Electrically operated valves are also produced and Warren-Morrison Ltd., 29 Bury Street, St. James's, London SW1, can supply valves complete with electronic control gear for automatic regulation of flow rate.

**BOXMAG
ELECTRIC
FILTER**

DESIGNED for the extraction of iron contamination such as fine iron and oxides from powders, granular materials, and liquids, the Boxmag electromagnetic filter has been developed by Electromagnets Ltd., Bond Street, Birmingham 19.

The equipment makes use of a specially designed magnetic circuit, which induces a high intensity magnetic field across steel grids in an aperture between the magnet units. The grids are so arranged that the material flowing through them passes freely, at the same time contacting the edges of the grid where any extracted ferrous contamination adheres.

Adaptable into chutes or ducting carrying materials, the equipment is arranged so that there is a bleed off discharge of the extracted ferrous contamination into a breaches chute or container.

**SPEEDFIX
STOPPING-OFF
TAPES**

A NUMBER of new technical tapes have been introduced to the range of Speedfix self-adhesive tapes made by Industrial Tapes Ltd., Speedfix House, 142 Old Street, London EC1, to enable 'stopping-

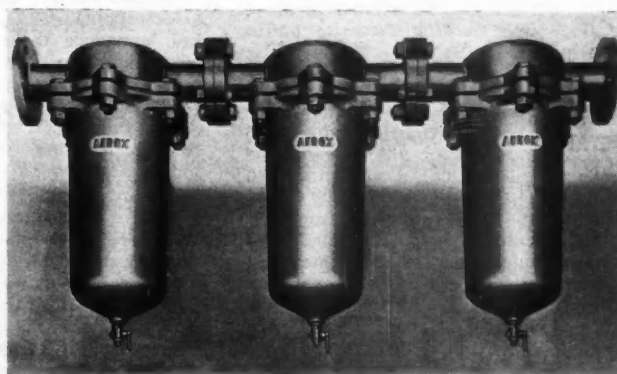
off' or masking out of certain areas in plating processes.

The new tapes are said to give resistance to acids, alkaline solutions and to temperatures up to boiling point; to give freedom from chemical reaction between adhesive and the metal surface; to be suitable for 'stopping-off' uneven surfaces.

The new tapes can be supplied in non-plasticised p.v.c. (white mix) vinyl; standard p.v.c. (white mix); coloured polythene; high-temperature p.v.c.; or varnish-saturated paper coated with polymerising pressure-sensitive adhesive.



A 'data panel,' in the form of a white transfer upon which pencil notes can be written, is a new feature which is optional for all items of interchangeable laboratory glassware made by Quickfit and Quartz Ltd., Stone, Staff. The panel is shown in the photograph which also shows Q & Q's new trade mark



Aerox adsorber equipment built up from three standard forms of equipment as described on page 1054



Ericsson's industrial batch counter, said to be capable of counting objects of varying shape and size at a speed of 350 pulses per second

INDUSTRIAL BATCH COUNTER

AN industrial batch counter, claimed to be capable of counting objects of varying size and shape into batches of any given number at a maximum counting speed of 350 pulses per sec., is being marketed by the instrument division of Ericsson Telephones Ltd., High Church Street, New Basford, Nottingham.

The count is displayed on dekatron tubes and the required count per batch is set up on rotary switches. According to the company, the instrument can also be used for the measurement of lengths. Necessary input pulses can be obtained from mechanical, photo-electric or electro-magnetic devices and output facilities suitable for the control of chute flaps and other equipment are available.

When the selected count per batch has been completed, the instrument automatically resets and the counting of a further batch commences. A manual reset switch is also provided.

THREE-STAGE FILTRATION SYSTEM

THREE-STAGE filtration system employing an Aerox pre-filter, a carbon adsorber, and a final filter of similar type to the pre-filter, has been produced by Aerox Ltd., Lister Place, Glasgow SW2.

The pre-filter is claimed to remove gross liquid impurities, wild yeasts and airborne bacteria, and the final filter is said to prevent ingress of carbon particles from the adsorber unit into the gas stream.

Assembled from standard Aerox units, the system is available over a wide range of flows and working pressures up to 7,000 p.s.i.g.

PORTABLE METAL DETECTOR

A NEW portable light-weight detector incorporating transistors has been introduced by Metal Detection Ltd., Moseley Street, Birmingham 12. This equipment comprises a hand unit and earphones and enables hidden metals to be located.

Weighing 4 lb., the unit is passed over the surface or object suspected of metal and the oscillator volume increases when metal is directly beneath the hand position.

TRADE NOTES

Foster Wheeler Contracts

For the new Caltex oil refinery at Visakhapatnam, India, Foster Wheeler designed and engineered a crude oil distillation unit, a decarbonising unit and a fluid catalytic cracking unit and gas recovery unit. The company was also responsible for the engineering of a polymerisation unit.

British Nucleonic Instruments

The fourth edition of 'British Nucleonic Instruments, 1957,' published by the nucleonic group of the Scientific Instrument Manufacturers' Association, will be issued on 5 July, price 10s 6d.

Union Carbide Process

A licence for Union Carbide Corporation's process of tungsten carbide coating of tools etc., for which a wear life up to 50 times greater than solid carbide is guaranteed, has been granted, for the first time outside the US, to John Harris Tools. A special factory is to be built in this country and production is planned to begin in October.

Thermometer Pockets

Closed-in tubes in p.t.f.e. for use as electrode sheaths or thermometer pockets in chemical vats can now be supplied by the Edison Swan Electric Co. Ltd. radio components and special products division at 155 Charing Cross Road, London WC2.

Transformer Department Move

Metropolitan-Vickers Electrical Co. Ltd. announce that the postal address of their transformer department has been changed to Southmoor Road, Wythenshawe, Manchester 23. For cables and telexes the department will continue to use the Trafford Park address: Metrovick Manchester Telex 66.314.

Kanigen Plate

The Kanigen plating process, now being operated on production scale by Albright and Wilson (Manufacturing) Ltd., who are also the sole licencees for the new process in the UK, Eire and Denmark, has recently been given the Ministry of Supply reference No. DTD/

Use of Glycerine in Food Wrappings

Two Belgian patents on wrappings for foodstuffs make use of glycerine. Belgian Patent No. 543,349 gives details of preparing a coating for meat, sausages, cheese, margarine, etc. This may be made from an aqueous emulsion or dispersion of a synthetic resin, a non-toxic plasticiser and, if desired, a filler. Glycerine in a 20 per cent concentration is one of the main constituents. The foodstuffs are spray, or coated with, or immersed in the liquid.

In the second patent (No. 542,402), a plasticising ester of a polyalcohol, preferably glycerol, and a lower aliphatic acid, preferably acetic acid or a triester, is used to seal plastic or plastic-coated films which are used for wrapping foodstuffs.

900/4505. The Ministry have indicated their approval of the application of Kanigen to certain carbon and low alloy steels, stainless steels and aluminium. Similar approval has been given by the Air Registration Board.

Fisons Price Standstill

There will be no increase in the prices of Fisons '30' range of agricultural compound fertilisers in England and Wales when the new season opens on 1 July. This applies to the triple superphosphate, single superphosphate and GNAP. Basic slag is subject to an increase, varying from 5s to 6d a ton according to grade.

UGB Raise Bottle Prices

As from 24 June prices of bottles and other glass containers produced by United Glass Bottle Manufacturers are to be raised by approximately 7½ per cent. UGB stabilised its prices in October 1955 but the company's total costs for wages, salaries, raw materials and fuels have increased since this time by about £780,000 a year.

New Manchester Office

Honeywell-Brown Ltd. have moved their Manchester branch office to Warsall Road, Northenden, Manchester 22.

Evascon Price Reduced

The price of Evascon asphalt concrete used for re-surfacing cracked and damaged flooring has been reduced from £93 to £60 per ton by Evode Ltd., Stafford.

Science and Food Preservation

'Science and technology as applied to the preservation and distribution of fresh food' is the subject of a meeting to be held on 25 June by the Parliamentary and Scientific Committee. Discussion will be led by Dr. R. Holroyd, a deputy chairman of ICI Ltd., who will be followed by Dr. J. H. Taylor, scientific advisor, farm and home division of Cyanamid of Great Britain Ltd., and Dr. J. C. Fidler, superintendent, DSIR food investigation section.

● **MR. S. W. ('PERK') JONES, Jr.**, has joined the development department of the FMC organic chemicals division of Food Machinery and Chemical Corp. as manager of plastics development.

● Following the recent Courtaulds offer to acquire the capital of British Celanese **MR. P. S. RENDALL**, a deputy chairman and a managing director of Courtaulds, has been appointed a director and vice-chairman of British Celanese. **MR. C. F. KEARTON**, a director of Courtaulds, has also joined the board of British Celanese as an additional managing director.

● **MR. WILLIAM E. JENKINS** has been appointed to the board of the A.P.V. Company.

● **MR. K. LEWIS** has been appointed project engineer of the industrial chemicals division of Olin Mathieson Chemical Corporation, Baltimore, Md., and **MR. J. R. KOHN** has been named assistant project engineer.

● **MR. H. J. NORTHEAST**, assistant sales manager of Dunlop's compositions division, has been appointed sales manager.

● Changes on the board of the Brush Group Ltd. include the resignations of **SIR RONALD W. MATTHEWS**, **LORD CUNLIFFE**, **CAPTAIN R. C. PETTER**, **MAJOR NOEL E. WEBSTER** and **MR. MILES BEEVOR**. The following have joined the board, **SIR FRANK SPRIGGS**, **SIR ROY DOBSON**, **MR. JOHN F. ROBERTSON** and **SIR ARNOLD HALL**, F.R.S.

● **MR. N. L. G. LINGWOOD** (British Oxygen Gases Ltd.) was re-elected president of the British Acetylene Association at the annual meeting held on 12 June. Other officers elected were: vice-president, **MR. E. SEYMOUR-SEMPER** (Hancock and Co. (Engineers) Ltd.; treasurer, **MR. F. W. SUMMERFIELD**. **MR. J. M. RIMINGTON**, managing director of British Industrial Solvents Ltd., has joined the council to maintain close contact with the Kenfig carbide factory, which was severed following the departure during the year of **Mr. Frank Newport**, to take up an appointment with Murgatroyds Salt and Chemical Co. Ltd., Sandbach, Cheshire.

● **PROFESSOR THOMAS WALLACE**, C.B.E., D.Sc., F.R.I.C., F.R.S., director of the Long Ashton Research Station, will retire at the end of the present session after 38 years' service with Bristol University. Appointed lecturer in agricultural chemistry and agricultural chemist to Long Ashton in 1919, Professor Wallace has been deputy director (1923-43), reader in agricultural chemistry (1933-43) and professor of horticultural chemistry and director of the station (1943-57). His position as an authority on trace-



Prof. Wallace

People in the NEWS

element nutrition of plants led to the establishment under his direction of the agricultural research council's unit for micronutrient studies at Long Ashton. Professor Wallace took an active part in the post-war reorganisation of the agricultural research services. He is a member of the governing bodies of East Malling Research Station, the John Innes Horticultural Institution, the Scottish Horticultural Research Station and of many horticultural colleges.

Under the title 'Wallace Testimonial,' the Long Ashton Station has set up a presentation fund which will be devoted to a gift for Professor and Mrs. Wallace. Contributions should be sent to the treasurer not later than 31 July.

R. S. Haskew, chairman and managing director of General Chemical and Pharmaceutical Co. Ltd., who was awarded an O.B.E. in the Queen's Birthday Honours List (p. 1042)



● From 1 July, **MR. I. C. R. BEWS**, B.Sc., A.R.I.C., at present a British Titan Products Co. Ltd. sales representative in Birmingham, will join **MR. C. G. T. PRINCE**, M.A., B.Sc., A.R.I.C., as a sales representative in the London office.

● New chairman of the British Section of the Franco-British Pharmaceutical Commission is **DR. A. D. MACDONALD**, professor of pharmacology in the University of Manchester. He succeeds **MR. JOHN HAMBURY**.

● **MR. N. G. BASSETT SMITH**, manager of Dunlop's compositions division, has been re-elected vice-chairman of the British Rubber and Resin Adhesive Manufacturers' Association.

● **MR. JOHN MONTGOMERY**, a director of Clyde Tube Forgings Ltd., has been appointed to the board of Shaw-Petrie Ltd. **MR. WALLACE FAIRWEATHER** has been appointed general sales manager of Clyde Tube Forgings Ltd. and Shaw-Petrie Ltd.

● **MR. S. M. LAWRENCE** has been appointed export sales manager of the British Aluminium Co. Ltd., with effect from 1 June, in succession to **MR. P. J. FERGUSON**. **MR. P. L. MARTYN**, assistant manager (home sales), will take over responsibility for unwrought and special products sales section in succession to **MR. LAWRENCE**. **MR. R. J. WALSH** has been appointed manager of the Manchester branch sales office at 46 Fountain Street, Manchester 2, with effect from 17 July, in succession to **MR. J. R. WHITELEGG**.

● **SIR HAROLD ROXBEE COX**, Ph.D., D.I.C., D.Sc., M.I.Mech.E., F.R.Ae.S., F.Inst.F., a director of Wilmot Breedon (Holdings) Ltd., and of The Brush Group Ltd., and formerly chief scientist to the Ministry of Fuel and Power, and **DR. C. J. SMITHELLS**, M.C., F.I.M., managing director of Magnesium Elektron Ltd., and a former director of research of the British Aluminium Co. Ltd., have been appointed members of the Council for Scientific and Industrial Research.

W. Morgan Thompson, the new director of Monsanto Chemicals, who as stated last week will continue as sales director



● **DR. OBERSTE-BRINK** of the Gelsenkircher Bergwerke AG, Essen, is leading a party of German industrialists now touring English and Welsh industrial plants and research establishments to study methods of effluent treatment and disposal, as well as water supply. They are visiting the works of Monsanto Chemicals, Courtaulds and Albert E. Reed and Co., the Colne Valley sewage works and the water pollution research laboratories at Stevenage. Arranged by the Federation of British Industries, the tour is a return visit of one made to Germany last year by members of the FBI trade effluent panel.

● The executive committee of the International Union of Leather Chemists' Societies has elected **MR. GEORGE FORSYTH** of the Highfield Tanning Co. Ltd., Runcorn, Cheshire, to be honorary secretary in succession to the late **MR. ARTHUR HARVEY**. **Mr. Forsyth** is a past-president of the Society of Leather Trades Chemists.

● **MR. W. E. DICK**, who has been appointed editor of *Chemistry and Industry* the weekly news organ of the Society of Chemical Industry, will succeed **MRS. BUSH**, the present editor, when she retires at the end of this month.

● **Babcock and Wilcox Ltd.** have appointed to their board **MR. IAIN MAXWELL STEWART** and the **RT. HON. LORD BRIDGES**. **Mr. Stewart** is chairman
(Continued on page 1058)

New US Solvent Extraction Plant for Uranium Recovery

A CONTINUOUS counter-current solvent extraction plant for recovery of uranium from acid leach liquors has recently been produced at the Shiprock New Mexico mill of Kerr-McGee Oil Industries Inc. The plant began operations in December 1954, and, as originally designed, it treated plateau carnotite ores by the acid cure process, which dissolved both uranium and vanadium minerals.

After acid curing for 16 hours the ore was conveyed to an agitator and leached for 2 hours in acid liquor at a pH of 1.0. The leached pulp was then separated at 100 mesh in a classifier with the sands continuing on through a washing classifier circuit, and the slimes going to a counter-current decantation system of four thickeners.

Leach liquor containing the uranium and vanadium values was passed through a column ion exchange plant for uranium recovery, and the barren liquors further processed by a precipitation method for vanadium recovery.

In mid-1955 an expansion of the mill was planned to double the original tonnage. It was also decided to alter the process and substitute a 16-hour agitation leach for the acid cure process since vanadium recovery was no longer of importance on the new ores. Agitation leaching also permitted reduced acid consumption and reduced labour costs.

Since more ore was to be handled, the expansion had to include additional equipment for recovering the uranium from the larger volume of leach liquor produced. The company had been studying solvent extraction in the laboratory for some time and this seemed to be a natural place for its application. Before definitely committing the expansion to

this new process, however, some experimental work on a larger scale was undertaken.

These tests were conducted by utilising idle equipment in the vanadium section of the plant. They were made on a batch basis in 50,000 gallon wooden tanks which had been used previously for vanadium precipitation. In these tests, a batch of feed liquor was pumped into one of the tanks and adjusted to the proper emf and pH. Solvent was added and the whole mixture agitated for 10 minutes and allowed to stand for an hour to separate into its two phases. The uranium-loaded solvent was then skimmed from the top of the aqueous phase, stripped with sodium carbonate solution and returned for a second extraction.

By repeating this extraction process several times, the uranium assay in the aqueous liquor could be lowered to the discard level. The operation was analogous to batch experiments in the laboratory and suffered the drawbacks of batch operation. However, even with this makeshift experimental set up it was still possible to raise plant output significantly since each batch contained the solution from approximately 75 tons of ore. This experimental procedure was incorporated as part of production and was in regular, steady operation from July, 1955, until September, 1956, and treated the liquor from many thousands of tons of ore.

The process, details of which were recently given by Wayne C. Hazen and A. V. Henrickson at a New Orleans meeting of the American Institute of Mining and Metallurgical Engineers, utilises di-2-ethyl hexyl phosphoric acid and tributyl phosphate dissolved in a high flash-point kerosene to extract uranium from

the acid leach liquor. The uranium-laden solvent is stripped with a 10 per cent sodium carbonate solution, and the barren solvent returned to the extractor. The uranium bearing carbonate liquor from the stripper is acidified and the uranium precipitated with ammonia or magnesia.

1958 Symposium on Microchemistry

A SYMPOSIUM on microchemistry is to be held at Birmingham University from 20 to 27 August 1958, under the auspices of the Society for Analytical Chemistry. It is being organised by the Midlands section and the microchemistry group.

The symposium will consist of original papers, covering recent advances in microchemical techniques, presented by chemists of international repute. The subjects will include: inorganic and organic qualitative and quantitative analysis, absorptiometry, chromatography, polarography, emission spectrography, radio chemistry, chemical microscopy, thermogravimetric analysis, biochemical methods, industrial applications, teaching.

In addition an exhibition of new and special apparatus will be held in conjunction with the symposium. Registration forms and further information may be obtained on application to Mr. W. T. Elwell, symposium secretary, ICI (Metals Division) Ltd., metals division, PO Box 216, research department, Kynoch Works, Witton, Birmingham 6.

British Atomic Sales Film

BRITAIN'S first coloured documentary film on the peaceful uses of atomic energy was shown to the Press on Tuesday. Entitled 'British Atomic News', it was planned as a sales promotional film and will be shown to foreign buyers to give them the chance of seeing and buying British atomic products.

Written and spoken by B. Charles-Dean and produced by 'Industrial Observer', the film, which is in Eastman-colour, has a running time of 30 minutes. It is the first of a series to be made by British Atomic News Ltd., 3 Albemarle Street, London W1.

The film opens with titles superimposed over two exterior designs of the nuclear power station to be built for the South of Scotland Electricity Board. A prologue, lasting about seven minutes, refers to Britain's progress in atomic energy and the production of radioactive isotopes and their use in medicine, industry, and agriculture. A reference to Calder Hall is followed by four 'designs' knitted into the overall pattern, covering aspects of processing and manufacture of some of the products and equipment of the companies who agreed to participate in the film and who sponsored its production.

A further six films are to be made, each of six segments of 450 ft. (five minute's running time). Any sponsor wishing to take two segments may do so, but all films will be limited to a maximum of 30 minutes' running time.

Copies of the film, 16 mm. or 35 mm., are available on hire on application to British Atomic News Ltd.

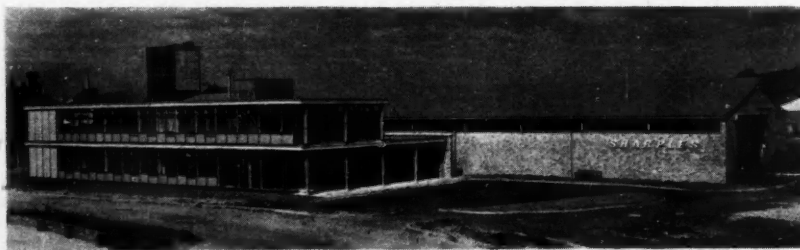
Sharples' New Centrifuge Works

NEW HEAD office and works of Sharples Centrifuges Ltd., at Tower Works, Doman Road, Camberley, Surrey, were opened by Mr. J. J. Serral, who is responsible for the company's overseas operations, on 14 June. The factory structure has steel portal frames, designed on the plastic theory, providing an uninterrupted bay size of some 200 ft. by 50 ft. and a maximum clear height of 20 ft.

Each frame can carry a two-ton load in addition to the building load. Within

the factory area are a pilot plant, laboratory and test bay linked with a glass-enclosed tower, designed to take special tanks used for development purposes. The sheet metal shop is provided with equipment for water cooled argonarc welding of stainless steel.

The new Tower Works will accommodate the production, planning and technical sales divisions of the company and will enable further extensions to be made in the applications of Sharples equipment in home and export markets.



Sharples new head office and works

Commercial News

With Projects Worth £3,815,000 Laporte will Increase Capital

LAPORTE INDUSTRIES propose to increase the authorised ordinary capital to £6 million by the creation of 7,507,448 additional 5s shares. It has not been decided how this extra capital should be raised or when it is needed.

Mr. L. P. O'Brien, chairman, states that the total value of projects authorised amounted to £3,815,000 at 31 March. Actual contracts placed for expansion of productive capacity in the UK and Australia are valued at £1,950,000.

There is a further commitment by subsidiary for an amount not at present ascertainable, arising from an arrangement with the Minister of Supply, which runs until 1968, subject to termination after 6 January 1961. This involves the Baronet Works, Warrington. Total expenditure to 31 March 1957, was £1,063,104.

It is hoped that capital expenditure during 1957 will be not less than £2.5 million, in which case, says Mr. O'Brien, 'we may have exhausted our liquid resources' (excluding trade investments) by the spring of 1958.

The group income, before tax, rose last year from £1,687,655 to £1,774,443, which is 5.1 per cent higher than any previously recorded figures. The dividend was maintained at 16 per cent. Given a good level of national prosperity, Mr. O'Brien expects satisfactory trading results for the current year. Annual meeting will be held at Winchester House, London EC, on 11 July at 11.45 a.m.

Borax (Holdings) Group

Trading profits of the Borax (Holdings) Group for the six months ended 31 March 1957 was £1,987,178. After deducting interest £97,255 and tax £769,496 the group net profit is £1,190,487. Because of the reorganisation scheme of the corporate and financial structure of the group which took place in 1956 it is not practicable, say the directors, to give comparative figures for the six months ended 31 March, 1956 nor can an exact comparison be made with one half of the group trading results for the full year ended 30 September 1956. No dividends on the deferred ordinary stock have yet been declared in respect of the year ending 30 September 1957.

Catalin Ltd.

Manufacturers of plastics, Catalin Ltd., report a group profit for 1956 of £27,892, compared with £16,706 for 1955. After tax of £12,867, £15,031 is left, which, with the balance of profit brought forward from 1955 of £9,689, amounts to £24,720 available for distribution. A dividend of 6 per cent, less tax has been approved. The first half of the year was the least profitable but there was a marked improvement later with increased turnover. However, the full advantage of this was offset by smaller margins. Expenses incurred in the development of new processes are stated to be at last 'bearing fruit' and have broadened the base of the company's activities.

Wm. Neill and Son

Industrial chemical and structural engineers, Wm. Neill and Son (St. Helens) Ltd., are paying a dividend of 33½ per cent (45 5/6 per cent last year) on £350,000 (£250,000) capital for the year ended 31 March 1957. Profit was £166,570 (£185,865) after tax, £187,000 (£194,000). The dividend absorbs £67,083 (£65,885).

Canadian Industries Ltd.

Sales of Canadian Industries Ltd. and its subsidiary companies were 11 per cent higher for the first three months of 1957 than for the corresponding period of 1956 with operating costs running about level with a year ago, announced Mr. H. Greville Smith, president, at the company's annual general meeting in Montreal.

Mr. Smith emphasised that the company was striving for utmost production and distribution efficiency and was scrutinising all costs to ensure their most effective contribution to productivity. Research was being given all possible encouragement and no opportunity would be overlooked for improving processes and applying new technology.

C.I.L. 'shares the guarded optimism of most of the economic forecasts for 1957' continued Mr. Smith. He looked for steady demand for C.I.L. products from construction and mining and from sustained manufacturing output and consumer expenditures. Contributing to 1957

results, he said, would be the 'output from new C.I.L. plants and further progress in the expansion of domestic and export markets for polythene and Terylene polyester fibre.'

Dunlop Rubber Co.

Trading profit of the Dunlop Rubber Co. for last year was £15,094,662. Net profit was £3,535,216. A dividend of 10 per cent is being paid.

Lord Baillieu, chairman of the company, dealt with certain broad features of the year's trading at the annual general meeting on Monday this week. He remarked that while there were excessive fluctuations in the price of natural rubber, the increasing need for synthetic rubber, to meet the world demand in total for rubber, considerably helped in stabilising and averaging the cost. The company was benefiting, he said, from their increasing use of synthetic rubber. Considering the European Free Trade Area, Lord Baillieu mentioned that the company had particular problems concerning its industrial property rights (trade mark, 'patents and designs), and where minority shareholdings exist.

It was stated that the company had continued to carry out a vigorous research policy on new processes, products and raw materials. Investigations suggested that the possibility of new advances in the synthetic rubber field had by no means been exhausted. There was much activity in Europe and North America on the applications of new polymerisation techniques that might give rise to a whole range of new synthetic materials ranging from fibres to rubbers.

The company was not only keeping closely in touch with the results arising from these new developments as they might affect its interests, but it was also carrying out active research on the production of new synthetic materials. Reference was made by Lord Baillieu to the synthetic rubber plant at Fort Dunlop and to the company's interest in the International Synthetic Rubber Co. This latter company's plant at Fawley was progressing well and it was 'confidently expected that production of at least 50,000 tons per annum will commence in the autumn of 1958'.

During 1956, close attention had been given to the possibilities opened up by the application of nuclear energy both as a potential source of power and as a new tool for the production of new materials and processes. An irradiation laboratory had been opened in June last year for research in this field, and close liaison was being maintained by the UK Atomic Energy Research Establishment at Harwell.

(Continued on next page)



"VULCAN" IRON AND STEEL CARBOY HAMPERS
SAFETY CRATES, PACKED CARBOYS
HARRIS (LOSTOCK GRALAM) LTD.
LOSTOCK GRALAM, NORTHWICH, CHESHIRE.

At the new Gateshead factory research had continued into the development of new products and under application of synthetic rubbers. In particular, further progress had been made in developing and marketing specialised applications.

McKechie Bros. Ltd.

McKechie Bros. Ltd., have declared an interim dividend of 5 per cent on ordinary for the year ending 31 July, 1957.

NEW COMPANIES

E. BRAUDE (LONDON) LTD. Capital £5,000. Manufacturers of and dealers in and agents and brokers in metals, minerals, ores, alloys and chemical and plastics substances etc. Secretary: M. Cooper, 73 Basinghall Street, London EC2.

Market Reports

COST FACTOR AND PRICE TRENDS

LONDON Trading conditions on the industrial chemicals market have been steady during the week with renewed buying interest in many sections, but there have been no outstanding features. Increasing costs remain an important factor in price trends although keen competition must be met in the export markets.

The fall in metal prices is reflected in the quotations for the non-ferrous metal compounds. Sulphate of copper 98/100 per cent is now £82 15s. per ton less 2 per cent f.o.b. Liverpool; zinc oxide white seal £100, green seal £98, and red seal £95 per ton for 2-ton lots, while new basis quotations have been notified as from 13 June for red lead at £122, white lead £130 and litharge at £124 per ton.

A good demand has been reported for most of the coal-tar products particularly for xylol, creosote oil and cresylic acid with the price position remaining firm.

MANCHESTER Sulphate of copper on the Manchester chemical market has further eased, but in pretty well all other

CAMPBELL AND CO. (MANCHESTER SALES) LTD. Capital £100. Consulting and contracting engineers to the chemical, plastic, rubber, textile and allied engineering process industries, chemical, mechanical, mining, structural, consulting and water supply engineers etc. Directors: C. Campbell, C. S. Gelbard, H. Kingsley. Registered Office: 11 Peter Street, Manchester 2.

SATISFACTION

F. COLLINS LTD. Manchester, chemical merchants etc. Satisfaction 24 May, of charge registered 1 April 1955.

CHANGE OF NAME

ABBOTT AND HAYNES LTD., retail, wholesale and manufacturing chemists etc., 736 Hertford Road, Enfield, Middlesex, changed to P. A. Haynes (Chemists) Ltd., on 18 March, 1957.

directions, quotations are now on a firm basis. Contract deliveries of the soda compound and other chemicals to the leading industrial outlets, including the textile and allied trades, are on steady lines, and a fair flow of fresh inquiry on both home and shipping accounts has been reported during the past few days. With an odd exception, the call for fertiliser material is at a seasonally low level. Among the tar products there is steady consumption of creosote oil, refined tar and benzole and xylol.

GLASGOW The demand for basic chemicals has been extremely firm and a good week's trading is reported from the majority of branches of the trade. Unfortunately certain sections of the textile industry are still rather quiet but on the whole this trade has brightened considerably. The call-off for chemicals for the agricultural side is still brisk and there was a marked increase in interest from overseas markets during the past week.

in about 80 per cent yield when the phenol was treated with dicarboxylic acid in the presence of sulphonic acid catalyst.

The reaction is being tried with dihydric phenols.

Papers by New Division of ACS

Papers presented by the recently formed division of inorganic chemistry, American Chemical Society, at the national meeting of the ACS held at Miami, US, on 7 to 12 April included 'Actinide elements' by Dr. Glenn T. Seaborg, Nobel Prize Laureate, 'The renaissance of inorganic chemistry and its future development' by Dr. R. S. Nyholm, University College, London, and 'Oxo and fluorocarbons of the transition elements with special reference to unusual oxidation states' by Dr. Wilhelm Klemm, University of Munster.

PUBLICATIONS

Research and Development in the Laboratory

The May edition of the *BTL Bulletin* published by Baird and Tatlock Ltd. describes the BTL wide range oven. This oven is designed for both static operation with or without convected air flow, and, with the addition of a circulating fan, for normal circulating or forced draft conditions. Temperature range is 50 to 300°C. In the last 12 months Baird and Tatlock have completed an extension to their laboratory fittings manufacture shop and in that time they have equipped 374 laboratories in Great Britain and 105 overseas countries at a combined cost of £380,000.

Expanding Agent for Resins

A leaflet describing Genitron N, an expanding agent for epoxy resins, has been produced by Whiffen and Sons Ltd., Fison House, 95 Wigmore Street, London W1. Procedures are described for Genitron N in combination with morpholine and diethylenetriamine, piperidine, and hardener HD, for expanding Epikote 834, made by Shell Chemicals, and Araldite F, made by Aero Research. Although any suitable wetting agent may be used, all experiments carried out by Whiffen employed Empilan BQ 100 made by Marchon Products.

Heat-by-the-Yard

'Heat-by-the-Yard' is the name given by Electrothermal Engineering Ltd. to heating tape which they have developed. The tape consists of a continuous network of resistance wires enclosed in a knitted elastic sleeve of glass fibre yarn made in $\frac{1}{2}$ and 1 in. overall widths and supplied in 25 or 50 ft. lengths. Maximum temperature is claimed to be 450°C on the tape and if this temperature is not exceeded it can be used on many different set-ups. 'Heat-by-the-Yard' is supplied by Baird and Tatlock (London) Ltd., Freshwater Road, Chadwell Heath, Essex.

ICI to Build Polythene Factory in Australia

A £A1,500,000 polythene factory is to be built by Imperial Chemical Industries Sydney, Australia. The factory will employ 200 and will be supervised at first by British technicians. Basic raw materials will be obtained from the by-products of the Australian sugar industry.

People in the News

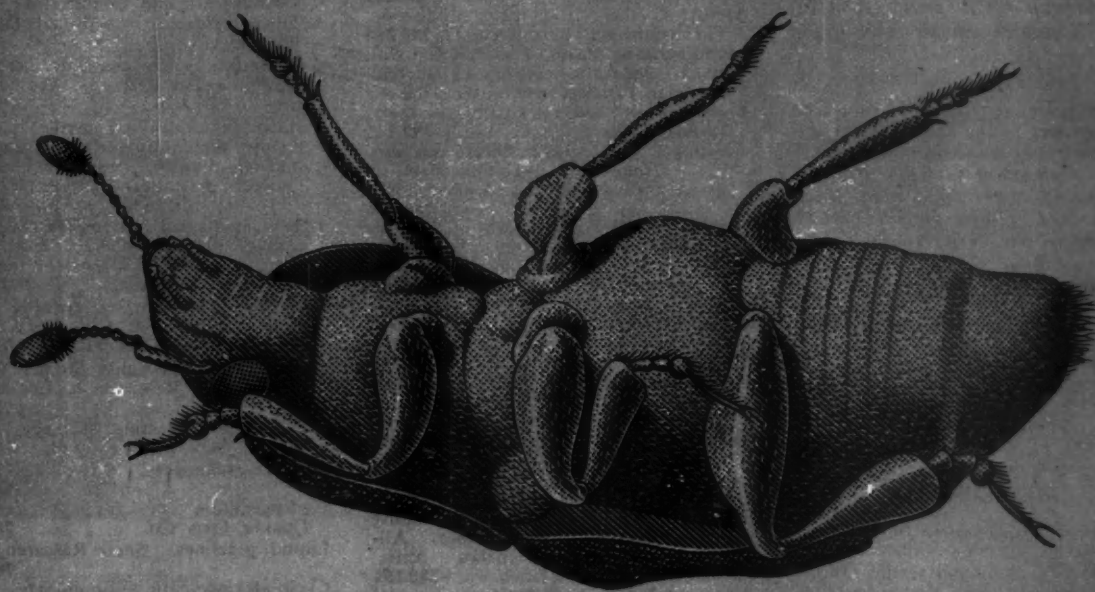
(cont'd from p. 1055)

and managing director of Thermotank Engineering Co. Ltd., and deputy chairman of Brown Bros and Co. Ltd. In 1945 Lord Bridges became permanent secretary to the Treasury and head of the Civil Service. He retired from the Civil Service in the autumn of 1956 and was created a baron in the New Year's Honours List 1957. In February 1957 he was appointed chairman of the governing board of the National Institute for Research in Nuclear Science.

Esterification of Phenols with Hexadecamethylene 1:16-dicarboxylic Acid

A method of esterifying phenols is reported by A. S. Gupta and J. S. Aggarwal of the National Chemical Laboratory of India, Poona (*J. Sci. Industr., Res.*, 1957, 16B, 182). These investigators observe that on heating hexadecamethylene 1:6-dicarboxylic acid and various monohydric phenols (1:2 mol.) in xylene solution 1-3 per cent *p*-toluene sulphonic acid or naphthalene-2-sulphonic acid for 10 to 12 hours and removing the water formed in a trap of the Dean-Stark type, 80 to 85 per cent of the phenolic diesters of the acid are obtained as pale white products. These can be converted to the corresponding diketones by Fries rearrangement. In the case of α -naphthol, it is stated, the diketone was directly obtained

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Harmless to animals

Pyrethrum-based Insecticides

Pyrethrum P.Y.R. is harmless to animals and human beings. It can be used safely in close proximity to foodstuffs.

Pyrethrum P.Y.R. combines very high knock-down with effective killing power. And with suitable synergists these effects can be markedly enhanced. Insecticides based on African Pyrethrum are particularly effective in dealing with flying insects and with pests that attack stored products. They do a first-class job in public health work and in the protection of food supplies. Insects do not develop resistance to Pyrethrum P.Y.R. as they do to many other insecticides.

Detailed information about African Pyrethrum and advice on its use for domestic, industrial and other purposes are available on request.

P.Y.R.
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The Pyrethrum Board of Kenya, Nakuru, Kenya Colony.
The Pyrethrum Board of Tanganyika, Mbeya, Tanganyika Territory.
Société Co-opérative des Produits Agricoles, Goma, Belgian Congo.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents),' which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London WC2, price 2s 6d including postage; annual subscription £6 6d.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

AMENDED SPECIFICATIONS

On sale 24 July, 1957

Esters of chloroformic acid. Pittsburgh Plate Glass Co. **624 604**
Closures for receptacles for containing petrol and like vaporisable liquids. Robinson, J. **653 963**

ACCEPTANCES

Open to public inspection on July 31, 1957

Production of films upon textile fabrics or the like. Britionia Chemicals Ltd. **780 244**
Molecular ordering of materials comprising high polymers. Dufour, P. F. J. **780 122**
Pigment preparations, their manufacture and use. Ciba Ltd. **780 316**
Manufacture of steroids with oxygen in 11-position. Ciba Ltd. **780 301**
Acid amide derivatives of azo-dyestuffs and process for making them. Ciba Ltd. **780 031**
Flux compositions adapted for use in aqueous solution for the soldering of metals. Olin Mathieson Chemical Corp. **780 033**
Phenthiazine derivatives. Soc. des Usines Chimiques Rhone-Poulenc. [Cognate application 19366.] **780 193**
Manufacture of ethylene. Farbwerke Hoechst AG. **780 257**
Lubricant. Esso Research & Engineering Co. **780 034**
Water softening devices. Rainsford & Lynes Ltd., and Lynes, R. K. **780 011**
Formation of hermetic seals between metallic parts. Electric & Musical Industries Ltd. **780 012**
Materials sampling apparatus. Coal Industry (Patents), Ltd. **780 428**
Driers for powdered or granular material. Matthews, C. H. [Cognate application 21346.] **780 332**
Destructive hydrogenation of hydrocarbon mixtures containing difficultly vaporisable components. Gulf Research & Development Co. **780 263**
Fibrous filter medium. Ford, Ltd., T. B. **780 265**
Diazoamino-compounds in dry form. Ciba Ltd. **780 266**
Production of combustible gas. Esso Research & Engineering Co. **780 335**
Driers for granular material. Bianchi, A., and Janetti, P. B. [trading as Soc. Italiana Essiccatoi]. **780 268**
Para-xylene production. California Research Corporation. **780 338**

Producing gas mixtures of controlled composition and gas mixture generators for carrying out these methods. Naamlouze Vennootschap de Bataafsche Petroleum Maatschappij. **780 453**
5-Nitro-2-furaldehyde semicarbazone Imperial Chemical Industries, Ltd. **780 281**
Methylol ethers and their production. Farbenfabriken Bayer AG. **780 284**
Manufacturing plastic sheet material with pearl essence incorporated therein. Patrician Plastic Corporation. **780 458**
Formation of chemical coatings on metal surfaces. Pyrene Co., Ltd. **780 230**
Treatment of synthetic fibres and fabrics. Naamlouze Vennootschap de Bataafsche Petroleum Maatschappij. **780 288**
Brazing flux and its preparation for aluminium. Horizons, Inc. **780 112**
Manufacture of steroids with oxygen in 11-position. Ciba Ltd. [Divided out of 780 301.] **780 302**
Polyethylene extrusion compositions. Du Pont de Nemours & Co., E. I. **780 289**
Polyacrylonitrile fibres having a scaly integument. Abbey, A. (Dow Chemical Co.). **780 375**
Preparing gas mixtures containing hydrogen and carbon monoxide. Naamlouze Vennootschap de Bataafsche Petroleum Maatschappij. **780 120**
Sealing means for receptacles containing metal in liquid or fused state. Allmanna Svenska Elektriska Aktiebolaget. **780 151**
Preparing highly basic polyvalent metal salts of organic acids. Naamlouze Vennootschap de Bataafsche Petroleum Maatschappij. **780 058**
Manufacture of blown asphaltic bitumens. Shell Research, Ltd. **780 156**
Method and means for continuously extracting an adsorbable solute from a clear solution or from a suspension of finely divided solids in a liquid. Commonwealth Scientific & Industrial Research Organization. **780 406**
Producing metal powder from solutions. Sherritt Gordon Mines, Ltd. **780 297**

3-Piperidyl ethers and thioethers. Schering Corp. **780 027**
Manufacture of hydrogen cyanide. Knapsack-Griesheim AG. **780 080**
Manufacture of viscose. Courtaulds, Ltd. **780 124**
Making isocinchomeric acid and decarboxylation of same to niacin. Aries, R. S. **780 271**
Method and device for distilling aqueous salt solutions to obtain potable water. Coanda, H., and Coanda, M. **780 272**
Synthetic glycols. National Distillers Products Corp. **780 205**
Carburetted water gas with heavy oil. Humphreys & Glasgow, Ltd. [Addition to 713 976.] **780 341**
Process for stabilising textile materials against dimensional changes and producing durable mechanical effects. Quaker Chemical Products Corp. **780 043**
Use of emulsified oils for the concentration of uranium ores by froth flotation. Minister of Mines for the State of South Australia. **780 021**
Cathodic protection of metallic structures. Hughes & Co., Ltd., F. A. [Cognate application 8153.] **780 348**
Lubricating compounds of the formal type. Esso Research & Engineering Co. **780 046**
Means for detecting leakages from tubes. Simon-Carves, Ltd. **780 349**
Pressure-exchangers. Spalding, D. B. **780 350**
Hydrogenation of furan derivatives. Quaker Oats Co. **780 275**
Liquid pipelines. Shell Research, Ltd. **780 129**
Cyclo-alkylaromatic sulphonates and lubricating oils containing same. Institut Francais du Petrole, Des Carburants et Lubrifiants. **780 276**
Determining viscosity of liquids. Manning, C. E. **780 214**
Dissoluble preparation, a method for its manufacture and solution manufactured from the preparation. Korposoff, G. **780 355**
Process and apparatus for the separation of solid materials of different specific gravities. Stripa Gruvaktiebolag. [Addition to 747 642.] **780 359**

Special Method of Analysis Evolved for Tobacco Smoke

THE Tobacco Manufacturers' Standing Committee has just issued its report for its first year's work on tobacco smoke and cancer dangers. Established in June of last year, under the chairmanship of Sir Alexander H. Maxwell, it has as scientific consultants, Sir Alfred Egerton, emeritus professor of chemical technology, University of London, and Sir Ronald Fisher, professor of Genetics, University of Cambridge. It is disclosed in the report that tobacco manufacturers are carrying out intensive research in this field in their own laboratories. The Imperial Tobacco Company has even evolved a 'smoking machine' which duplicates as far as possible human smoking. Models of this machine have been supplied to outside research institutions engaged on similar investigation. By adaption, the machine can be used for 'pipe smoking.'

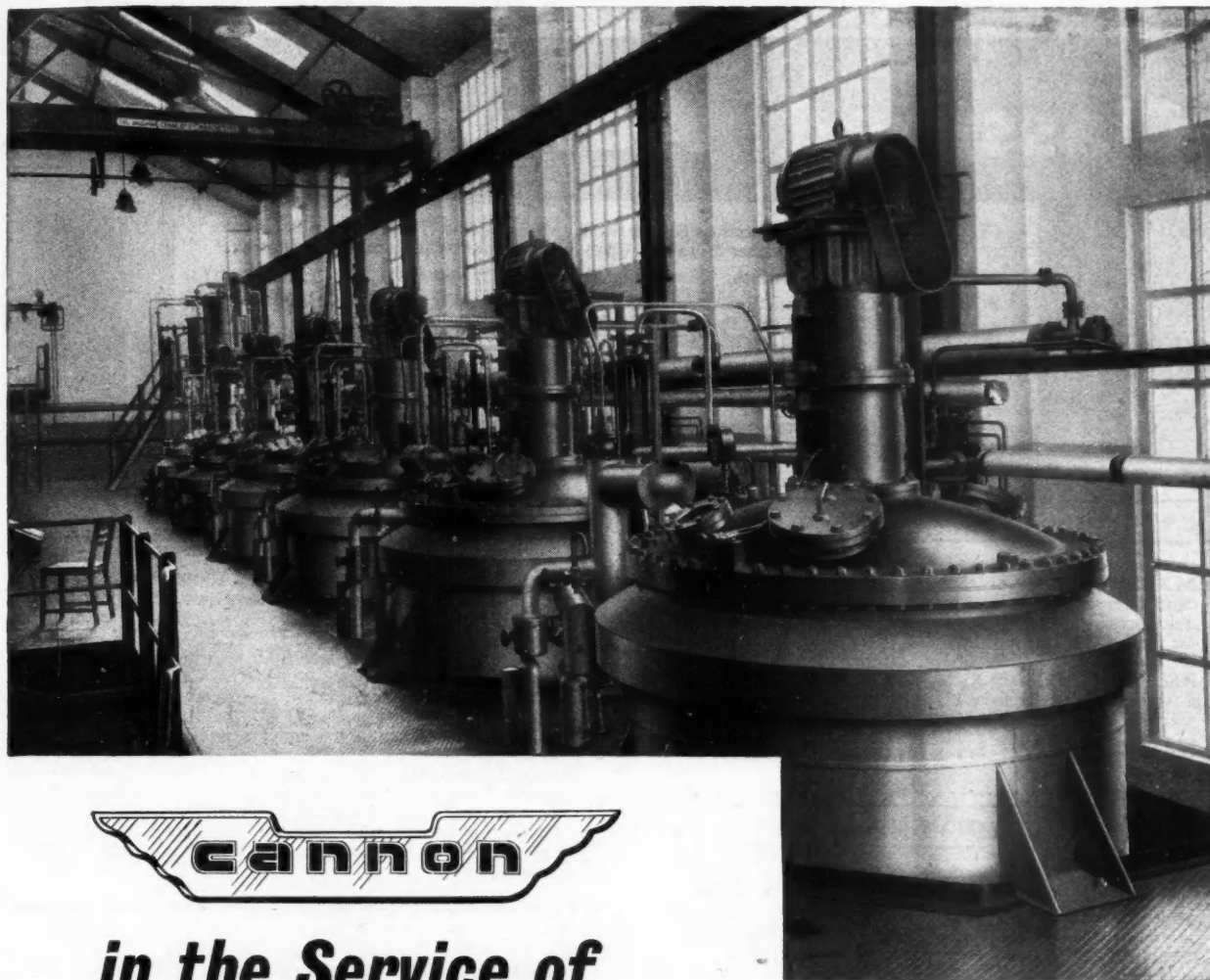
For analysis of benzpyrene (a substance known to cause cancer in experimental animals) in cigarette smoke special methods have had to be developed, due to

the infinitesimal quantities of this substance present in the smoke. These are of the order of one part in 100 million by weight of tobacco consumed. The analytical methods used are based on chromatography and spectral analysis.

Investigations have indicated that only 10 per cent of the benzpyrene present in cigarette smoke comes from paper. Also, measurements carried out on air in a West Country town showed that the daily intake of benzpyrene from the air was equivalent to smoking 40 cigarettes a day. Daily air in London was found to be equivalent to 100 cigarettes a day.

The report shows that it has not been possible to substantiate the suggestion that tobacco smoke contains small quantities of dibenzanthracene, another cancer-inducing agent.

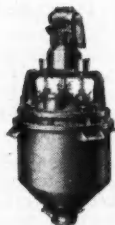
The TMSC announce in their new report that they propose to set up a new fund to promote research into problems relating to smoking and health, besides the existing donation to the Medical Research Council.



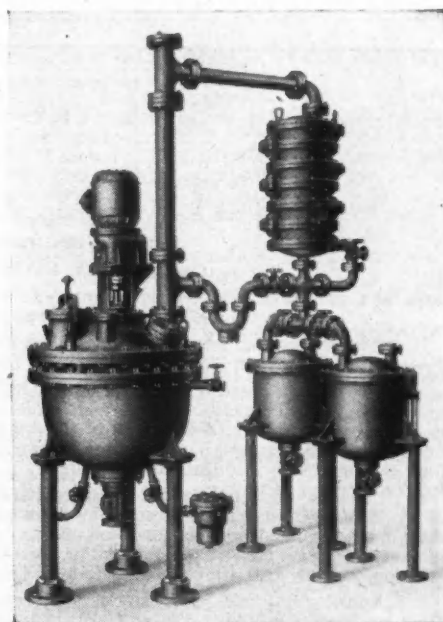
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THE NATIONAL INDUSTRIAL FUEL EFFICIENCY SERVICE invites applications from qualified Mechanical, Chemical, Heating and Ventilating Engineers or Fuel Technologists for posts in the basic professional grade of **ASSISTANT ENGINEER**. Industrial experience will be an advantage.

Vacancies exist in London, and Leeds, Cardiff, Glasgow and Belfast provincial Area Offices. Commencing salary in London will be in the scale £967 to £1,432 per annum, and elsewhere £932 to £1,362 per annum. Opportunities for promotion to senior posts will arise.

Successful candidates will be required to serve a probationary period of not more than one year and will become members of the Company's Superannuation Scheme after one year's service. Application forms may be obtained from the National Industrial Fuel Efficiency Service, Dept. A.E., 71 Grosvenor Street, London, W1.

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The principal need is for Physical and Organic Chemists, although there are several opportunities open to Chemical Engineers and in a few cases, to Physicists. In addition to technical competence, the Organisation seeks men of character and determination who can work in harmony with others. For certain of the appointments some industrial experience would be useful; however, the Division is equally interested in candidates who will be coming down from University this year, and also in those who before the end of 1957 will have completed their National Service obligations.

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*SITUATIONS VACANT: continued***CHEMIST OR PHYSICIST**

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- (a) **ADMIRALTY, 9;**
- (b) **BRITISH MUSEUM—NATURAL HISTORY, 1;**
- (c) **DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH, 9;**
- (d) **MINISTRY OF SUPPLY, 20.**

Age at least 31 on 31 December 1956. Candidates must have 1st or 2nd Class Honours Degree, or equivalent, in an appropriate subject and at least three years' approved research experience. Candidates exceptionally well qualified by experience may be admitted without the academic qualifications. For all posts candidates must have had several years' appropriate experience and be of proved research ability.

Under (a) 5 posts are for Physicists, 1 for a Physical Chemist, 1 for a Mechanical Engineer, and 1 for an Electrical Engineer. The posts are at naval establishments in the southern half of England; duties involve taking charge of research design and development work. There is also a Mathematics post for the analysis and reduction of data.

Under (b) a specialist in the Taxonomy of European Flowering Plants is required.

Under (c) three of the posts are at the Laboratories at Teddington—1 in the Ship Division, 1 in the Radiochemistry Section, and 1 in the Metal Corrosion Section; 1 is in the Road Research Laboratory at Langley, Bucks, 1 at the Mechanical Engineering Laboratory at East Kilbride near Glasgow, for experimental and theoretical research in hydrodynamics and low-speed aerodynamics, 1 at the Low Temperature Research Station at Cambridge for research on food microbiology, 1 in London to act as liaison officer in the field of processing and metallurgy, 1 in Edinburgh to act as liaison officer on matters relating to scientific research and development. The work entails extensive travelling and lecturing, and 1 in London on administrative duties on Departments scientific policy and its choice of programmes and allocation of resources.

The posts for (d) are classified under Applied Mathematics, Physics, Aeronautical and Mechanical Engineering, Electrical Engineering, Chemistry, and Metallurgy for work on guided weapons, electronics, aerodynamics, radio, radar, etc.

Fuller information about the duties and the kind of experience expected is given in the memorandum.

Salary (London), minimum £1,375 (women £1,288). Men's scale maximum, £1,950. Exceptionally, starting pay above minimum. Somewhat lower outside London. Women's scale is being raised to reach equality with men's by 1961.

Application forms and memorandum from Civil Service Commission, Scientific Branch, 30 Old Burlington Street, London, W1, quoting S4714/57/8. Applications to be returned by 18 July 1957.

Z4268/170/5/57/MC/b

OFFICIAL APPOINTMENTS: continued

SENIOR EXPERIMENTAL OFFICERS.

The Civil Service Commissioners invite applications for pensionable posts:

- (a) **MINISTRY OF AGRICULTURE, FISHERIES AND FOOD;**
- (b) **DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH;**
- (c) **MINISTRY OF SUPPLY.**

Age at least 31 on 31 December, 1957. Candidates must have a University Degree, or a professional qualification or Higher National Certificate in appropriate subjects. A Higher School Certificate (or equivalent) with Mathematics or Science as the principal subject, may for some posts also be accepted. Candidates exceptionally well qualified by experience may be admitted without the academic qualifications. For all posts several years' appropriate experience is required.

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Under (b)—5 posts: Two are at the Road Research Laboratory, Harmondsworth—one for work in connection with the civil engineering services of the Laboratory, and the other for editing work and the preparation of bibliographies, in collaboration with the senior Scientific Staff of the Laboratory, on matters of road-making materials and traffic and road safety; one at the Mechanical Engineering Research Laboratory at East Kilbride, near Glasgow; one at the Hydraulics Research Station, Wallingford, Berks, to take charge of the experimental work on problems connected with open-channel flow; one in London in the Technical Information Unit, for which a reading knowledge of German and experience in a technical records section is desirable.

The 15 posts for (c) are classified under Applied Mathematics, Physics, Aeronautical and Mechanical Engineering, Electrical Engineering for work on guided weapons, electronics, aircraft equipment, etc. Some posts require knowledge of Chemical Engineering, Applied Physiology (Clothing), and Metal Corrosion. Posts requiring experience of technical information work, for which candidates may apply irrespective of scientific background, may also be included.

Fuller information about the scope of the work is given in the memorandum.

Salary (London), minimum £1,285 (women £1,191). Men's scale maximum, £1,530. Exceptionally, starting pay above minimum. Somewhat lower outside London. Women's scale is being raised to reach equality with men's by 1961.

Application forms and memorandum from Civil Service Commission, Scientific Branch, 30 Old Burlington Street, London, W1, quoting S4713/57/12. Applications to be returned by 31 July 1957.

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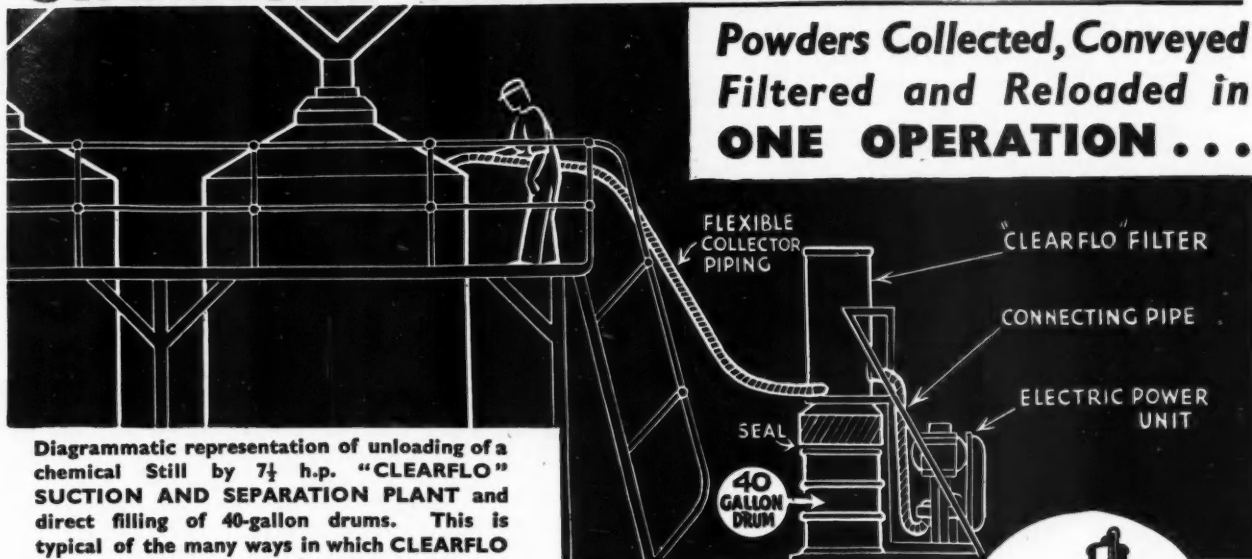
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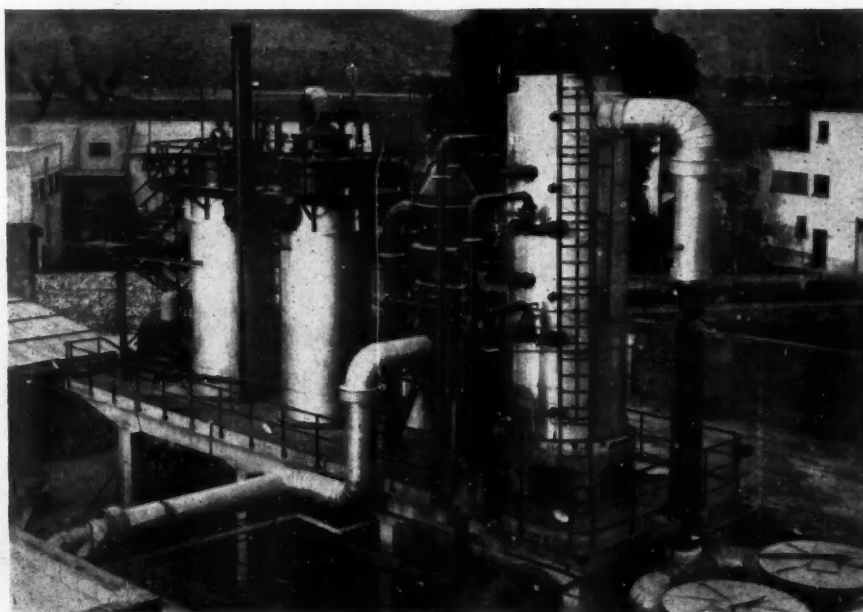
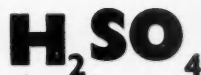
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